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ESSAY ON VEGETABLE PHYSIOLOGY.

(Continued from page 17, last No.)

CHAP. III.

DIFFERENCE BETWEEN THE ROOT AND STEM; 1st. IN THE DIRECTION OF THEIR GROWTH; 2d. IN THE ABSENCE OR PRESENCE OF BUDS; 3d. IN THE MANNER OF THEIR GROWTH.

Having completed our examination of the elementary vegetable structures, and of the organs formed immediately from them, viz: the cellular, woody, and vascular tissues; we will now commence our investigation into the structure, and vital action, of the compound organs of plants. These, as has been already mentioned, are divided into two classes; according as they are intended to minister to the growth of the plant, or to the production and perfection of the fruit. The first class, including the root, stem and leaves, being termed organs of vegetation; and the second, including the calyx, corolla, stamens, and pistils, being termed organs of fructification.

The root and stem, we will examine in connexion. The central part, or axis of a plant, that part to which all the other parts are attached, consists of two distinct portions; the ascending portion, or stem, and the descending portion, or root. The common definition of the term root, is "that part of the trunk which fixes the plant to the soil, and burrows beneath its surface." This definition will answer as a popular one; but if we wish to get a more correct idea of the nature of the root, it will be necessary to attend to the differences which exist between it and the stem a little more in detail.

One of the most striking peculiarities of the root is in the direction of its growth. If a seed be placed in the ground, in favorable circumstances, the embryo plant within it soon begins to grow in two opposite directions; one of its extremities manifesting an invincible tendency to grow upwards into the air and light, and the other an equally invincible determination to the earth, away from the light. If after a seed has sprouted its position in the ground be reversed, so that the stem shall point downwards and the root upwards, they will both twist entirely around, in order to develope themselves in their proper media. This fact is commonly explained by saying, that the root is attracted by the moisture of the earth, whilst the stem is attracted by the air and light. It is, to say the least, a very loose use of language, to talk about the attraction of the root, for moisture, or of the stem, for air and light. Attractions are those forces which different portions of matter exert on each other, tending to bring those portions together. If a particle A, be attracted by another particle B, of equal size, the force exerted is as much exerted by A as it is by B; and the tendency of A to move is no greater than that of B. If one of these bodies be in any way fixed, it is plain, that all the movement must be made by the other. Such are, in fact, the circumstances in which the young root of a plant and the moisture of the earth are placed. The young root is fixed, whilst the moisture is moveable. If then there is an attraction between the two, the moisture should move up towards the root, and not the root down towards the moisture. The same remark will apply with even greater force to the supposed attraction between the stem, and the air and light. One of the facts which is most frequently brought forward in support of this notion of attraction is, that when a plant is placed in a dry and barren spot, in the immediate neighborhood of a more moist and fertile one, its roots are always found to increase more rapidly in the direction of that moist and fertile portion than in any other. This, as we shall hereafter see, is not owing to any attraction exerted by the moisture upon the roots, but to an entirely different cause.

This matter has been put to the test of direct experiment. Dutrochet filled a box with moist earth, and having pierced the bottom with many holes, he placed within the box, and near to its lower surface, a number of beans, and then suspended it in the air about eighteen feet from the ground. The seed being thus situated, it should follow, that if the young stem is attracted by the light, and the root by moisture, the former should shoot downwards into the air, and the latter upwards into the moist earth. This, however, did not take place; but, on the contrary, the radicles descended into the atmosphere, where they soon dried up and perished; whilst the stems ascended vertically, forcing their way into the earth. He then placed some of the small plants so that their roots pointed directly up into the soil; but instead of fixing themselves therein, their points soon turned around, and grew in an opposite direction. Supposing that possibly the quantity of earth might affect the direction of their growth, he afterwards made use of a much larger box, and accumulated a very considerable mass of earth above the seed, but the result was the same as before; thus proving that the stem is not attracted by air or light, neither is the root repelled by light or attracted by moisture.

That the radicle is not attracted by moisture, the same naturalist afterwards proved more directly by another experiment. He suspended in a glass jar a piece of sponge, so placed as to present a flat verticle surface in one direction. One end of this piece of sponge was made to dip into a cup of water, so that it might always be kept filled with water. He then suspended within the same jar, a germinating bean; bringing its radicle as near to the verticle face of the sponge as was possible, without touching it. In this case, if any attraction had been exerted upon the root, by the moisture of the sponge, a slight turn of the former would have brought them in contact. The radicle, however, grew perpendicularly, manifesting no tendency to turn towards the sponge. The true explanation of this matter appears to be this: that as roots lengthen, by the addition of new matter to their extremities, in a soft or semi-fluid state, they grow downwards, under the action of the attraction of gravitation.

The young stem, on the contrary, growing by the increase of parts already formed, has from its first developement, a tendency to grow in the direction in which the bud points. If, in consequence of the buds pointing obliquely, the young stem shoots in an oblique direction whilst yet beneath the surface of the soil, the juices accumulate on the lower side, and thus causing it to elongate more rapidly than the upper side, the erect position of the stem is restored. The bud from which the stem grows contains every part of that stem, and all its appendages, in miniature. If the axis of this bud, i. e. the stem in miniature, points perpendicularly upwards, and its after-growth is effected simply by the enlargement of these points, it is plain, that the stem must have the same direction as the axis of the bud; or, in other words, must grow in the direction in which the bud points. The root does not grow from a bud, but increases in size by the addition of separate portions of semi-fluid matter to its extremity; it will, therefore, increase downwards, for just the same reason that an icicle does. If this explanation be the correct one, it will follow, that when, in a germinating seed, the root happens to point directly upwards, and the stem directly downwards, the two parts should grow in these directions; yet, being in a state of unstable equilibrium, the slightest variation from a vertical line would cause them in time to resume their proper directions. In confirmation of this view, De Candolle placed a hyacinth in water, and having fixed its bud so as to point directly downwards, caused its stem to develope in that direction.

Mr. Knight, to whom we are indebted for this explanation of the downward tendency of the root, has tested its correctness by the following very ingenious experiment. He constructed a wheel, and on its circumference fastened a quantity of moss. In this moss he placed a number of beans; and by means of a stream of water, which served at the same time, to moisten the seed, the wheel was made to revolve vertically, at the rate of 150 times in a minute. In this rapid revolution, the seeds were subjected to the action of a centrifugal force, acting in the same manner as gravity; but much more powerfully, and in a different direction. After some days, the wheel was stopped, and on examining the growing seed, it was found that each young plant, had taken the direction of the radii of the wheel, the root being turned directly from, and the stem directly towards the centre of revolution. This experiment was varied, by causing the wheel to revolve horizontally; and the result was, that when the wheel revolved with a moderate velocity, the roots were directed obliquely downwards and outwards, and the stems obliquely upwards and inwards; in obedience to the joint action of the centrifugal force and the attraction of gravitation. The more rapid the revolution of the wheel, the nearer did the axis of the plant approach to a horizontal direction; but when the wheel revolved slowly, the attraction of gravitation preponderating, the young plants grew in a nearly vertical direction. The only objection which I have ever heard urged to this explanation, is this: if the root descends by the action of gravity, how is it that the lateral divisions of the root often grow in a direction nearly horizontal? In answer to this, I would say, that the lateral divisions of the root grow horizontally, because they meet with some obstruction to their perpendicular growth. The longest horizontal roots are generally to be found lying between the loose porous soil and the harder and more compact substratum of earth beneath that soil; and they grow in that direction, for just the same reason, that the water (which certainly descends under the action of gravity) collects to a greater or less extent, in a horizontal sheet, at the same place.

Some parasitic plants, such as the common misletoe *(viscum verticillatum)* furnish the only real exceptions to this rule. These direct their roots, (if indeed they can be called roots) towards the stem of the plant on which they grow; and always grow nearly at right angles to the part of the stem to which they are attached. The nature of the body, does not affect the result. The seeds of the misletoe, if made to germinate upon the surface of a common ball, will turn all their roots towards the centre of that ball. The attraction of the body to which the mistletoe fixes itself, cannot be admitted even in this case, as the cause of the direction which the roots take, as Dutrochet has shown by the following experiment. "I glued" says that distinguished botanist "a germinating seed of the mistletoe to one end of a delicate copper needle, mounted upon a pivot, a little ball of wax being placed as a counterpoise upon the other extremity. I then placed by the side of the needle thus prepared, a small block of wood, at the distance of about a millemetre (nearly one-twentieth of an inch) from the radicle. The apparatus was next covered with a glass shade, so that no external cause could disturb the needle. In five days, the young plant began to direct its radicle towards the piece of wood, the needle not changing its position, although it was extremely moveable. In two days more, the radicle was directed perpendicularly to the block, the point being in contact with it, and yet the needle had not moved in the slightest degree." On this experiment it is sufficient to remark, that had any attraction been exerted by the block, upon the root, instead of causing the end of that root to be turned up, and sustained in a horizontal direction, it should have caused the needle to move around, so as to touch the block. The reason why the roots of a parasitic plant turn towards the stem of the plant on which it grows, we must at present look upon as one of the secrets of nature. Perhaps at some future day, when vegetable physiology has been more studied, and is better understood, we may be able to explain the mystery. Except in the case of parasitic plants, the root shows an invincible tendency, to grow downwards into the soil, whilst the stem, shows an equally invincible tendency to grow upwards into the air.

A second peculiarity of the root is, that it forms no buds, whilst the stem always forms them. As roots form no buds, and of course develope no leaves, they present neither scales, which are the rudiments of leaves, nor scars, which are the vestiges of them. These remarks, however, are to be understood as applying to roots and stems in ordinary circumstances only. In extraordinary circumstances, the roots of some plants have the power of forming buds, which are hence termed adventitious buds. So also the stem, which, in ordinary circumstances, has not the power of putting forth roots, in extraordinary circumstances,

does furnish itself with adventitious roots. It is well known, that when the trunk of a Lombardy poplar *(populus dilatata)* is cut off near to the ground; and even in some instances, where the trunk is not cut off, but parts of its roots project above the surface, those roots will produce buds and young shoots, in abundance. It is also well known, that if a stalk of the weeping-willow *(salix babylonica)* be cut off, and stuck in moist ground, it will soon form adventitious roots, and become a tree as readily as if raised from the seed.

Du Hamel performed a singular experiment upon a young willow. He bent the trunk, so as to bury the extremities of the branches in the ground; after these had taken root, and had established themselves in their new situation, he uncovered the true roots, and elevated them into the air; thus turning the tree upside down. The roots, adapting themselves to their new situation, produced buds and leaves; whilst the former branches took the place of roots. We must not, however, infer from this, that roots and branches are mutually convertible into each other. The branches in this case were not changed into roots, by being buried in the earth, nor even the roots changed into branches, by being elevated into the air; but the buried branches, gave rise to adventitious roots, whilst the roots, in the new and extraordinary circumstances, in which they were placed, gave rise to adventitious buds. This power of forming adventitious buds, is peculiar to the roots of some plants, and not common to those of all. The roots of the silver fir of Switzerland, will sometimes live for half a century after the stem is destroyed, but will never sprout again; whilst the roots of the Lombardy poplar, will put forth buds almost as readily as the stem itself.

A third distinction between the root and the stem is to be found in the manner of their growth; the stem always manifesting a tendency to grow with perfect regularity, whilst the root never does. In this particular, the stem and the root are admirably adapted to the different media in which they develope themselves. Burrowing beneath the soil as the root does, and having to make its way in an unequally yielding medium, now having its progress stopped on one side by a rock or some other hard substance, and then on the other side, it would have been impossible for it to have grown with perfect regularity, even had provision been made for such a growth. But not so with the stem; shooting as it does up into the air, it can increase equally well in every direction. If we examine a young shoot of any plant, as the dog-wood (*cornus sanguineus*) for instance, at the close of its first year's growth, we will find its leaves disposed with perfect regularity. In the plant selected they are placed in pairs, and regularly alternating with each other, as to the sides of the stem on which they grow. If the first pair point north and south, the second will point east and west, the third north and south again, and so on. The buds, which are in fact the rudimentary branches of the next year, are formed only at the points at which the leaves are joined to the stem, and of course must be placed on that stem with the same perfect regularity which characterizes the disposition of the first year's leaves. The same remarks will apply to the branches of each succeeding year. If a plant could grow, entirely exempt from the operation of all disturbing causes, it would be as perfectly regular as if put together by the hand of art, with the square and compass. The only reason why plants never do present this appearance is, that they always are affected, more or less, by certain external causes, which disturb their growth.

I will mention some of these disturbing causes, and illustrate their operation. We will suppose that a plant, during the first year of its life, has formed eight buds, and that each of these is packed away under its sheath of scales, in order to stand the storms of winter. The sheaths are seldom so formed as to be a perfect protection against water. It is almost always the case, that if a drop of rain happens to strike them precisely upon the tip, it will penetrate into the bud. If after such an accident has happened, a cold night occurs, this water will freeze, and thus, the bud, and all that in other circumstances would have sprung from it, will be destroyed. It frequently happens, that of the buds formed one season, not more than one-half live to open and grow the next spring. Now, it is very improbable, that if one-half of eight buds be thus destroyed, they will be either the first, third, fifth, and seventh, or the second, fourth, sixth and eighth; and yet all these would be necessary in order that the plant may retain a perfect regularity of form.

Again: there are many insects which by instinct are taught to pierce the stems of plants in order to deposite their eggs. Whenever this is the case, the part thus pierced swells up, and disorganization, to a greater or less extent, ensues. The nut-gall, the green balls which we often see on the leaves of the oak, and the excresences which we see on the stems of plants, are all produced in this way. If we suppose that the wound inflicted by the insect exerts no positively deleterious influence upon the growth of the plant wounded, yet, as an excrescence is formed, a part of the nutritious matter, which, in ordinary circumstances, would have gone to increase the size of the limb, is necessarily employed in the formation of the excrescence; and of course the limb must suffer in size on this account. Thus, an irregularity in the form of a plant may be produced.

Again: we know that direct sun-light is necessary to the healthy growth of a plant. So soon as a tree has grown to some considerable height, its upper branches shade those beneath them, and thus induce in them a diseased growth, and even death itself. All are familiar with the fact, that what is commonly called the trunk of a tree, seldom presents any branches. This is not because it did not send out branches in the first instance, but because the branches which it did form have been overshadowed and destroyed by those growing higher up upon the stem. In the case of a species of pine common in lower Virginia, the branches of which are early filled with resin, and on that account do not easily decay, a series of dead branches may be seen stretching from the root up to the living branches of the tree. Trees growing in the forest, where they are shaded by the surrounding trees, seldom present many lateral branches, except towards the top; whilst those growing in the open field, where the sun-light has free access to them on every side, generally spread their branches far and wide.

Again: a young shoot may be bent by the wind; if bent but little, its elasticity will generally restore it; but, if bent much, it receives a permanent crook, and thus an irregularity is produced. The

same effect may by produced by snow and ice, which, in the winter, frequently accumulate upon young trees, aud the young limbs of trees, and bend them towards the earth. Thus it is, that though there is a tendency in trees towards a perfect regularity in growth, so that if they could be freed from the operation of all disturbing causes, they would appear as if morticed together by the hand of art, and would be in their outlines perfect cones, yet we never see them presenting this regularity of form.

There are one or two facts respecting the operation of these disturbing causes, which are worthy of a passing notice. One of them is, that most of them operate more powerfully in the winter than in the summer. To this, as well as to the fact, that they are longer exposed to this operation, must be attributed the far greater irregularity which we observe in perennial than in annual plants. The catnip, (*nepeta cataria,*) which has none of these disturbing causes to contend with, except those which operate in the summer, and these only for a short period, presents but slight deviations from its regular form; whilst the oak, which lives from year to year, and from age to age, bearing the storms of a hundred winters, is well characterized as the "gnarled oak." Another fact worthy of notice is, that although the operation of these causes seems to be in the strictest sense accidental, so that we can assign no reason why one bud should be destroyed rather than another, or why an insect should sting one branch rather than another; that yet their destroying effect is so managed as to be consistent with a general regularity of growth. About as many buds are destroyed on one side of a tree as on another. Seldom, if ever, do we meet with a tree so lop-sided (to use an unauthorized but very expressive word,) as to endanger its stability. Although a tree is very irregular in the minutiæ of its growth, yet it is regular in the midst of all its irregularity.

Chap. IV.

PRINCIPAL OFFICE OF THE ROOT. SPONGELETS. BIENNIAL ROOTS. COLLAR OF PLANTS. UNDER-GROUND STEMS, THEIR NATURE AND STRUCTURE.

Having attended to some of the more important characteristic features of the root, we will now examine that organ a little more in detail. The root of the garden bean *(vicia faba)* may be assumed as the type. The root of this plant consists of a main stem, irregularly divided, and subdivided, into what are called the branches of the root, or rootlets. From this, which is by far the most common form of the root, we meet with many departures. The root of the carrot, *(daucus carota)* consists of a mass of vegetable matter, of a conical form, and having all its rootlets at its lower extremity. In the turnip *(brassica rapa)* this mass is nearly globular in its form. Most grasses have no regular main-root, but a number of rootlets starting from one common point, the base of the stem. Lichens have no regular root; but the whole of the lower surface of their leaves, lying in contact with the ground, or rock, or bark on which they grow, absorb nourishment for them, and thus perform the office of roots. There are many modified forms mentioned by botanists; but as they are very uncommon, it is not worth the while to mention them, when our object is an examination into the physiology of plants.

The principal office of the root, is to absorb nourishment from the soil. This absorption is not effected by the mass of the root, and throughout its whole length, as is generally supposed, but by a peculiar class of organs, situated along the smaller sub-divisions, or rootlets only. It is somewhat difficult to get a distinct view of these organs. So long as the root remains buried in the moist earth, they are distended by the liquids which they contain, and which they absorb rapidly from the soil. In order to fit them for the performance of their appropriate work, they have necessarily been made permeable to liquids in the highest degree; and hence, when taken out of the ground, and exposed to the dry atmosphere, suffering these liquids to pass out, with the same facility with which they passed in, they soon shrivel up, and lie so close to the main root, as to be with difficulty distinguished from it. The easiest way to get a sight of them, is to place the root of a growing plant in water, which in this instance, may be considered a transparent kind of soil; in such circumstances they quickly become distended, and stand out visibly from the side of the rootlet. From a similarity in the structure of these organs, as exhibited under the microscope, as also in their manner of action, to little sponges, they have received the name of spongioles or spongelets; and by this name we shall hereafter mention them.

That roots absorb nourishment solely by means of their spongelets, Sénebier has proved, by the following simple experiment. He took two young radishes (*raphanus sativus*) from the ground, with their stems and leaves; one was so placed that its apex only (the part on which the spongelets are situated) dipped in water; the whole root of the other was plunged beneath the surface of the water, excepting the apex, which was exposed to the air. The leaves of the former, remained fresh for several days, whilst those of the latter soon began to wither, and only recovered their freshness, when the extremity of their root was immersed. This is an experiment which has been frequently repeated, and always with similar results.

The form of the sponglets of plants, which derive their nourishment immediately from the soil, is always spherical or spheroidal. In that curious class of plants termed parasites, (of which the misletoe may be mentioned as an example,) which instead of searching in the earth for their own food, fix themselves upon the stems of other plants, and live by robbing, the spongioles have the form of disks; thus fitting them to fasten themselves to the stems of other plants, and also to absorb the greatest quantity of nourishment from those plants. Spongelets in this form, fasten themselves to the stems of plants, in just the same way in which children fasten moist pieces of leather to stones, in order to lift those stones.

Spongelets as I have already remarked, are situated only along the smaller sub-divisions of the root. A knowledge of this fact, will suggest several rules to be observed in the cultivation of plants. First, when manure is used to assist the

growth of a young tree, or of any plant which spreads its roots to some distance, the manure should not be placed at the point where the stem enters the ground, but at some distance from that point, and as nearly as possible over the extremities of the roots; because it is at these parts, and these alone, that the roots can absorb the nourishment furnished by the manure. Second, when a vine is to be set out near a tree, in order that it may be supported by that tree, it should be set close to the trunk, rather than at the distance of several feet from it, because if set at the distance of several feet from the tree, its spongelets will have to absorb nourishment from the same portion of earth as those of the tree, and thus the two will interfere with each other's growth; but, if placed near to the tree, the spongelets of the two will operate upon different portions of earth, and of course will not interfere with each other. Third, as what is commonly called the soil is the portion of earth which furnishes nourishment most abundantly, it is advisable to cause the roots of a plant to spread horizontally, rather than perpendicularly; to keep them in the soil, rather than to suffer them to penetrate beneath it. This the German gardeners effect, in the case of fruit-trees, by placing a flat stone in the bottom of the hole in which the trees are to be set, and then setting the young tree directly upon this stone. There is only one precaution to be observed in adopting this method, and that is, not to place the flat stone too near the surface, least the roots should not take sufficient hold upon the ground, to enable the tree to resist the action of high winds. The best point at which the roots of a tree can spread, is along the lower surface of the soil. The reason for this we shall see, when we come to examine into the nature of the sap. Fourth, in transplanting trees we should take great care of the rootlets, or smaller sub-divisions of the root, as these are the efficient parts of that organ. If the root have several branches, it is better to cut off all those branches excepting one, and to retain that one with all its sub-divisions perfect, than to cut off the ends of all the branches, as is the common practice. I have heard of an excellent plan, sometimes pursued in transplanting the *arbor-vitæ* or flat cedar, (*thuga occidentalis*,) a tree which it is very difficult to move without killing. The plan is this. During the spring preceding the autumn or winter when the young trees are to be removed, the roots are all cut off at a convenient distance from the stem, (a foot or eighteen inches will be sufficient if the tree is small) by striking a sharp spade in the ground, at the point where they are to be cut. The tree is then left standing for the summer; during this time the branches of the root, being deprived of the greater part of their rootlets, will form others in great numbers, and of course all of these will be situated near the stem, and will be easily removed with it. Whenever a young tree is removed according to the method ordinarily pursued, it of course has to form almost an entire set of new rootlets, before it can be prepared to operate to advantage in its new situation. Besides this, it has to establish the rootlets which are left attached to its stem, in a new place. The effect of both of these operations, is to check the growth of the plant. Sudden and great checks, are always much more injurious to the growth of a plant; that slighter checks, though they operate for a much longer time. The advantage of the plan which I have mentioned, over the common plan lies in this; that a slight check continued for some time, is substituted for a sudden and great one. Fifth, as rootlets, and more especially spongelets, are delicate organs, and of course easily broken, it is much better to take up at least a portion of earth with the root, than violently to shake all the earth off. Where the earth is shaken off, or the plant pulled up, instead of dug up, a great many of the rootlets are always broken off, and of course the growth of the plant is checked. It is an excellent plan, to remove young trees whilst the ground is frozen hard around their roots. In such circumstances, the earth which is attached to the root, seldom breaks off, and thus, all destruction of the rootlets is avoided.

Both of these plans last suggested, have, to my own knowledge, been pursued with evident advantage. In the case of trees, such as the *arbor-vitæ*, which it is difficult to remove without killing, they should always be pursued; in the case of many trees, trees of easy growth, it does not seem to make so much difference; yet, even in the case of these, there can be no doubt that it does make a difference. There is always a best way of doing every thing; and if we would expend our labor to the greatest advantage, we should always endeavor to ascertain this best way, and if it be but a little more difficult or laborious than an inferior one, always pursue it. It is by attending to little things that great things are accomplished; and more especially is this true with respect to improvements in agriculture. Besides this, it should always be borne in mind, that a difference which may be inconsiderable in the case of a single plant, may become one of great importance in the case of a crop, consisting, as many of our common crops do, of thousands and tens of thousands of plants.

There is a fact, with respect to biennial plants, which is worthy of notice. Biennial plants are such as require two years to attain their full growth; or such as bear their seed the second season after they are planted. During the first year of their growth, their vital energy is expended in the formation and enlargement of their root, and in filling its cellules with nutricious matter. During the second year, their roots undergo no increase of size; but the whole of the nutritious matter collected in them during the previous year's growth, is expended in perfecting the stem and seed. All are familiar with the fact, that whilst the root of a common beet (*beta vulgaris*,) affords a great deal of nourishment if taken at the close of its first year's growth, it is good for nothing after the plant has gone to seed. The reason of this is, that when we delay until at the close of the second year, the plant anticipates us, and we get nothing but the dry empty cellules, or boxes, from which the nutritious matter has been already removed.

The most important office of the root, is that which I have already mentioned, viz: to absorb nourishment from the soil. When a plant first springs into independent being, it sends one single stem upwards, and a single root downwards. As the stem spreads, the root also spreads. As the twig of one year the next year becomes a branch, so the rootlet of one year the next year becomes a root; and thus the two go on increasing propor-

tionably in size. As these two parts of a plant are intended to operate together, the one furnishing the material and the other working it up; in a healthy state of a plant, they will always preserve their relative size. It has sometimes been made a question, whether it was advisable to lop the branches of a tree when we transplant it. If the ends of the roots are cut off, as is commonly the case, I should decide the question in favor of lopping the branches also; and perhaps even where the roots are not cut off, as their action is checked to a certain extent by being placed in a new situation, it may be advisable to lop the branches to a small extent. The only other office of the root, which I shall mention at present, is that of fixing the plant in the ground, and thus enabling it to rear its stem in the atmosphere, and spread abroad its leaves, so that under the action of sun-light, they may be enabled to perform their appropriate functions.

Between the root and the stem there is no definite organic separation, but the two melt, as it were, together. Nevertheless, the imaginary line formed by their union, has received the name of collar or neck, and great importance has sometimes been attributed to it. A very common impression is, that the collar is the seat of vitality; and that if a tree be cut through at its collar it will never grow again. If such trees as the pine and the oak, be cut off at the level of the ground, it is true, that they never will sprout up a second time; but there are other trees, such as the Lombardy poplar and willow, which may be cut directly through the collar, or even below it, without preventing the part which remains from shooting forth young stems, to take the place of those which have been removed. This proves that the opinion that the collar is the seat of vitality, is an erroneous one. The fact that many trees, when cut off at the surface of the ground, are effectually killed, whilst others are not, is to be accounted for in a different way. As I have mentioned in a previous chapter, the roots of some plants have the power of forming adventitious buds, and thus giving rise to stems, whilst others are entirely destitute of this power. If a plant of the first kind is cut off at the surface of the ground, and its root is suffered to remain in the soil, that root is placed in the most favorable circumstances for developing adventitious stems. If a plant of the second kind be treated in the same way, as its roots are incapable of forming adventitious buds, it is of course effectually killed. That the collar is not the seat of vitality, those farmers whose land are over-run with sassafras, (*laurus sassafras*,) must have found out to their sorrow.

In stating that the roots of plants do not, except in extraordinary circumstances, form buds, it is necessary that I should point out a distinction, which botanists make, between true roots and under-ground stems. Of these underground stems, the tuber of the potato, (*solanum tuberosum*,) or what is commonly called the potatoe itself, may be mentioned as an example. These always form buds. They are distinguised from true roots by the formation of buds; and from true stems by the character of their buds; for whilst the buds of true stems send forth branches only, the buds of underground stems always send forth both roots and branches. It is necessary, both for the sake of exactness of language, and for practical purposes, carefully to distinguish between these two classes of organs. For whilst an under-ground stem is one of the means destined by nature for the multiplication of plants, true roots never perform this office except in circumstances special and very unusual. Neither do such stems appear to perform the office of roots. They seem intended to act a part similar to that of seed, their buds taking the place of the embryo, and their mass the place of the parenchyma of the seed. Like seeds, they are destined to give rise to new individuals of their species, and to furnish them with nourishment, until their roots are sufficiently developed to perform that office. Hence it is, that before sprouting, they are filled with nutritious matter, and form a very important article of food; but after sprouting they are shrivelled and dry, consisting, like the roots of biennial plants after their second year's growth, of nothing more than empty cellules, which the growing plant has exhausted of all nutritious matter; and hence too it is, that a potato, although not buried in the earth, will sprout and grow very well, so long as the nutritious matter which it contains lasts, but so soon as that is exhausted, will die.

Under-ground stems present a very considerable variety, both in form and in structure. The tuber of the potato is generally more or less globular in form, and always homogeneous in structure; the cormus of the tulip is far more regular in its shape than the potato, but like that, is homogeneous in its structure; the bulb of the onion has the same shape as the cormus of the tulip, but instead of being like that, homogeneous in its structure, it consists of a number of concentric bands, easily separable from one another. The botanist considers these as modified leaves; the scaly bulb of the lilly is more evidently made up of modified leaves. The root-stock of the sweet-flag, (*acorus calamus*) which presents us with still a different form of under-ground stem, is a thick-jointed stalk, sending forth shoots and roots from every separate joint. These are some of the common forms of underground stems; there are others which are more uncommon, and which it is hardly worth our while to notice on the present occasion.

The wild onion, or garlic, (*allionia vineale*,) forms its bulbs at the top of its stem, among its flowers and seed; the orange lilly, (*lilium bulbiferum*,) a plant common in gardens, forms its bulbs at the points where its leaves are joined to the stem; the common white lilly (*lilium candidum*,) forms its bulbs at the base of the old bulbs, and not from the roots; and the potato in like manner forms its tubers at the extremities of short underground branches, as is evident from inspection during the forming state of tubers, and not upon the roots, as is commonly supposed. By particular management, De Candolle states, that he has caused potatoes to form on the ordinary branches of the plant, and even at the axils of the leaves. That the tubes are formed upon the under-ground branches, and not upon the roots of potatoes is a fact which should be borne in mind, in attempting to determine the best manner of cultivating that vegetable. The circumstances which seem most favorable to the developement of these underground branches on which the tubers form, are, the exclusion of light and a proper degree of moisture. If the light be not excluded, the branches, if developed at all, will be like the common branches of the plant; if there be not sufficient moisture present,

the branches will not form at all. The circumstances which seem most favorable to the production and perfection of the tuber, are, the exclusion of light, a proper degree of moisture, and protection from the intense heat of the sun. The effect of light upon the tubers, is to render them green and bitter, by converting their nutritious matter into matter similar to that of which the leaves of the plant are composed. The want of moisture prevents the full developement of the tuber. The effect of the intense heat of the sun is to harden the tissues of the tuber, so as to unfit them for the performance of their office. Besides this, it is important that the soil, or whatever it may be in which the tubes grow, should be so loose as not to oppose any obstacle to their increase in size. It should also be borne in mind, that the tubers derive nourishment from the soil, not immediately, but through the true roots.

With these remarks, I will venture to propose what I should consider the best plan for cultivating potatoes. Let the ground be prepared in the ordinary way; lay the potatoes in the bottom of the furrow, and cover them to a depth of three or four inches with coarse manure, or leaves, and then with two or three inches of earth. After the stalks are six or eight inches above the ground, cover all except their ends under in the same manner; and perhaps, this process may be advantageously repeated a third time; after which they should be suffered to go to seed. The first covering should, unless the land be very rich, consist in part of manure, in order to furnish nourishment to the plant; the second and third, may consist of straw or leaves, as the principal object is to keep the earth loose, and to protect the tubers from the action of the sun. It is not, perhaps, generally known, that there is no more effectual protection for ground, against the intense heat of the sun, than a covering of dry leaves. Where they cover the ground to the depth of three or four inches, on removing them, even in the hottest weather, you will find the ground moist under them. Hence it is, that they assist a crop of potatoes, even where they are not covered with earth, so as to cause more tubers to form amongst them. I have never known potatoes to be raised in just the manner which I have proposed, but in many instances, I have known them to be raised, in methods somewhat similar; and so far as my observation has extended, the nearer the method adopted has approached to the method which I have proposed, the better the crop has been. I have known an excellent crop of potatoes to be obtained by simply laying the seed-pototoes in a furrow, and covering them to the depth of a foot or more with dry leaves and straw. Many farmers are in the habit of covering their potatoes with loose sod instead of simple earth, always turning the grass side of the sod under, so as to prevent its sprouting; and very good crops are raised in this way. But whatever plan we may adopt, a knowledge of the nature of the tuber, and of the manner of its growth, would suggest that it should be kept sufficiently moist, should be protected from the light and intense heat of the sun, that the earth around it should be kept loose; that the lower part of the stalk should be covered under after it has grown to some considerable height; and that the manure which is intended to assist the growth of the plant, should be placed around the true roots, and not the tubers, as these last, like the other parts of the plant, derive their nourishment through the true roots.

(To be continued.)

MEMOIR TO CONGRESS ON THE BEET CULTURE.

To the honorable the Senate and House of Representatives of the United States of America in Congress assembled:

The memorial of CHARLES LEWIS FLEISCHMANN, a naturalized citizen of the United States,

Respectfully represents:

The existence of crystallizable sugar in the beet-root was discovered by the German chemist Markgraf, in the year 1747. He communicated the results of his experiments to the Royal Academy of Sciences at Berlin; pointed out the importance which his discovery would have on agriculture and industry, and endeavored to bring it into practice; but at that time, the price of sugar being moderate, chemistry not advanced to modify the complicated operations, and the spirit of enterprise not sufficiently awakened to make it an object of speculation, the discovery remained without being put into practical use until the year 1796, (forty-nine years afterwards,) when Achard, another Prussian chemist, repeated the experiments of Markgraf, modified them, and erected the first manufactory at Kunnern, in Germany.

The results of Achard's manipulation created great sensation all over Europe, particularly in France, where the chemists re-examined the process of Achard, simplified it, and made it more practicable and profitable in its results.

These simplified manipulations were adopted by enthusiastic speculators, full of sanguine expectations, peculiar to the French character; but the results were not satisfactory, as the immensely large and costly manufactories were partly established in places where the soil was not sufficiently productive, where fuel was scarce and high, the market distant, and the operations directed by men, who had not the least idea of agriculture—a science necessarily connected with the manufacture of the beet-sugar—nor practical knowledge of an entirely new process, and a most imperfect apparatus. The consequence of these obstacles was a complete failure, which induced the opinion over the whole world, that the extraction of sugar from the beet, though correct in theory, was impracticable on a large scale.

This, however, was not the opinion of enlightened men; they saw the causes of failure in their true light, and endeavored to overcome and to correct them. The political events of 1812 accelerated the developement of this new branch of industry; the French government, in want of a substitute for the colonial sugar, encouraged the manufacture of the beet-sugar, by establishing four large manufactories, and teaching the best method of extraction.

In 1814, these manufactories were in full operation and flourishing, when the peace of Europe allowed the importation of the colonial sugar into France, causing a destructive shock to the manu-

facturers of indigenous sugar, which none but immense fortunes could endure, and created, again, the belief that the manufacture of the beet-sugar could never come in competition with the colonial.

This might have been the final catastrophe of the manufacture of the beet-sugar, had it not been for the efforts made to revive it again by some wealthy and enlightened manufacturers.

These efforts, however, did not arise entirely from the patriotic desire to promote the welfare of France, (as now pretended,) but partly to prevent the loss of immense capitals invested in buildings, apparatus, farms, &c. Moreover, the manufacturers knew there was yet five or six per cent. more to gain by an improved operation.

This it was that gave a new start to this favorite branch of industry; and chemistry, particularly adapted to improve the art and manufacture, assisted in simplifying the process, and discovered the mode of *reviving* animal charcoal so as to admit of its being repeatedly used, while the improved apparatus helped to economize labor and fuel; and all this, combined with a wonderful perseverance, reduced the expenses of the fabrication, and enabled the old establishments to continue in operation, even when the price of colonial sugar was very low. This created confidence and a rapid increase of establishments.

The cultivation of the beet has had the most beneficial influence on agriculture; as, in the last year, more than eighty thousand acres of land were planted in beet, producing about one million of tons of this root; and, as generally rotations of four crops are adopted, it brought at least three million two hundred thousand acres of land under the highest cultivation.

The following table shows the rapid increase of the manufactories, and the quantity produced, in France.

In 1828 there were 103 manufactories, which

		Beet-sugar.
produced		100,000 cwt.
1831	200	220,000
1836	543	950,000
1837	600	1,000,000

Or 20,000 tons of beet-sugar.

The manufacture of indigenous sugar did not affect the demand for colonial sugar, as the consumption continually increased until the year 1836, as appears by a table from the Journal of Commerce of 1836, viz:

In	Consump. of colon. sugar.	Con. of beet-sugar.
1825	61,255,232 fr.	4,000,000 fr.
1831	67,542,792	10,000,000
1832	62,669,638	15,000,000
1835	69,000,000	30,000,000

But, in the year 1336, France imported only 75,120 tons of colonial sugar—a diminution of 15,630 tons in one year; a *quantum* too large not to alarm the proprietors of the sugar plantations in the French colonies, and particularly in Martinique, who looked, some years ago, with an ironical smile at the beet-sugar manufacturer. They, who have ridiculed and caricatured every improvement in this branch of industry, felt themselves forced to send, in 1835, Baron de Cools, with the following proposition of the French government, viz: demanding—

1. Diminution of the duties upon French colonial sugar of 50 per cent., and a proportional reduction of duties upon the foreign colonial sugar.

2. The permission to export the colonial sugar direct to a foreign market.

3. A careful examination and investigation how the French colonial and beet-sugar manufactories can be equally taxed.

The latest news from France states that the government came, finally, to the conclusion of an equal taxation upon the indigenous and colonial sugar, as may be seen from the following extract from a New York paper, (Morning Courier and New York Enquirer of December 18, 1838,) dated

[By the Ville de Lyons]

Paris, October 30, 1838.

"A branch of industry, (the offspring of necessity under the empire,) the production of sugar from beet-root, has engaged much attention in France, and has been carried on with success, and to a vast extent. The natural consequence has been, that sugar, the produce of the French colonies, which is burdened with a very large duty on importation into France, *was beaten out of the market.* Appeals were made by the *suffering colonists* to the government, repeatedly, representing the distress into which they had fallen from this circumstance; the irremediable ruin that would necessarily fall upon them if the present tariff were maintained, and soliciting relief. After a variety of expedients to evade a decision on the point, the government has just come to the resolution of proposing to the chambers, (which are to meet on the 24th December,) to reduce the import duty on colonial sugar by 8¼ francs per cwt., which, with a precisely similar excise duty levied on the beet-root, or home-grown sugar, will, they say, suffice to re-open the market to the colonies."

Such is the state and results of the indigenous sugar mnufacture in France.

What is the progress of this branch of industry in the other parts of Europe?

England, (the mother of colonies,) which was very much prejudiced against the manufacture of indigenous sugar, seems to see, in the adoption of it, the only means of improving the physical and moral condition of man in her colonies; and she has already overcome some of her prejudices, and has begun to establish manufactories. The following article, taken from the London Mechanics' Magazine of 1836, (No. 169,) will show its progress:

"A refinery of sugar from the beet-root is being erected at Thames Bank, Chelsea, which, it is expected, will be in operation in about six weeks. In the vicinity of the metropolis, during the past summer, a great many acres of land have been put into cultivation with the root, at Wandsworth and other places. The machinery will be principally on the plans of the vacuum-pans, and *a pure refined sugar* will be produced from the *juice* by the *first process of evaporation*, after it has simply undergone the process of discolorization. Another part of the premises is appropriated to the manufacture of coarse brown paper from the refuse, for which it is extensively used in France. In case the goverment do not interfere, and, by rendering the product excisable, retard or prohibit its manufacture, several individuals have it in contemplation to establish refineries in different parts of the kingdom for purifying sugar, which may be produced in agricultural districts for do-

mestic or foreign use. A refinery has lately been establised at Belfast, in the vicinity of which town upwards of two hundred acres of land have been put in cultivation with the beet-root for the manufacture of sugar."

Russia, which adopts every useful improvement in manufacture, has, in the southern departments, large manufactories of beet-sugar, by which she expects to furnish some of the Asiatic markets with this article. So have Bohemia, Hungary, Austria, and Switzerland large beet-sugar manufactories, in the most flourishing condition.

The Germans, though the discoverers of the crystallizable sugar in the beet-root, until 1836 made very little progress in its manufacture. This is to be ascribed as well to the continual war with France, which checked every improvement, as to the uncertainty of the business itself. The Germans, well aware and well informed of every improvement made abroad, never found it sufficiently lucrative to embark in it; but it seems that this nation which has given the world so many great and important discoveries, was destined to bring its own discovery of the extraction of the sugar from the beet to perfection. This was accomplished by Mr. Schuetzenbach, of the Grand Duchy of Baden. Schuetzenbach re-examined carefully Markgrafi's experiments, and found that the first experiment of this great chemist, made eighty-nine years ago, is the best method, when modified, to produce, with less labor and expense, eight pounds of white refined sugar out of 100 pounds of the raw beet-root. This improvement it is, which will, in a short space of time, exclude all the colonial sugar from the European market, as well as our own. This improvement, also, will change the condition of millions of men in the colonies.

The opinion and judgment of a nation, jealous of every discovery or improvement made in other countries, and especially in this branch of industry, in which it has sacrificed millions of francs for its perfection, will serve as a proof of the importance of the new improvement. These new discoveries are detailed in an article which appeared in the *Journal des Debats Politiques et Literaries*, in Paris, dated the 16th July, 1838; by Michel Chevalier, viz:

"It would seem that the spirit which was manifested in the days of the revolution, has been transferred from the political arena, and is exerting itself in that of industry. At this time, the manufacture of sugar from beets is on the point of undergoing a metamorphosis which, as it appears, will change all the condition of its existence, and extend its influence, not only to the consumption, but also to the production of that article.

"Until now, a series of operations has been applied to the extracting of sugar from the beet, which, though simple enough in appearance, are in reality complicated and delicate; which demand not only a great number of intelligent and skilful workman, but also require considerable material to be operated upon; and which, again, consume costly articles, such as milk, blood, animal charcoal, &c.

"In the former process the sugar-beet was scraped; the pulp pressed by means of an hydraulic press. The juice so obtained, underwent defecation, or the separation of the albuminous and mucilaginous elements, and then the clarification and evaporation. Once concentrated, the sirup underwent crystallization, which furnished the raw sugar; and this then had to be refined before it could be admitted on our tables.

"Since its origin, the process of extracting the sugar has always been the main point, but it has been modified and improved in the details; so much so, that our manufacturers, who were ruining themselves when the sugar was at six francs the pound, are becoming rich at the low price of 20 sous per lb. At this time, the scraping, pressing, defecation, clarifying, and evaporating were attended with difficulties, which it required a great length of time to subdue. The loss in manufacturing was enormous, as only from three to five parts of sugar were obtained from a hundred pounds of beets, instead of ten pounds, which are contained in the root.

"With the assistence of chemical analysis, it was ascertained that this evil proceeded from the presence of a certain quantity of acid, of divers coloring, mucilaginous, and gelatinous matters, suspended in the juice. The presence of these mischievous substances injures the sugar, prevents it from crystallizing, sometimes destroys it, and causes it to yield only poor molasses. To prevent these injurious effects, different agents have been used, which were found more or less efficacious. Apparatus was constructed, which accelerated the manufacture, and diminished the time during which the sugar is in contact with these injurious substances; but the inquiry was never made whether it were possible to separate the sugar from those foreign bodies, or at least to neutralize or paralyze their destructive power, before the juice is extracted.

"The new process, first alluded to, was discovered in the grand duchy of Baden, by Mr. Schuetzenbach, of Carlsruhe. The experiments introduced a method of manufacturing the sugar, which was adopted by several manufacturers on the right bank of the Rine, and which is already in vigorous operation.

"Like all ideas which are destined to accomplish revolutions in manufactures, as well as in politics, that which serves as the basis to the new process is simple. The operation of drying the beets immediately after they are taken from the field, is now the first step in the process. By this operation, the mucilaginous matter, which is an integral part of the beet, losses the property of dissolving in water; this drying stops also the fermentation which takes place during the preservation of the beets in cellars or in the heap, and likewise prevents the formation of acids, which were created at the expense of the sugar, and which embarrassed the manufacture of beet-sugar.

"When the beets are once dried, the sugar is easily obtained by mixing them with a small quantity of water, which produces a solution of sugar and a very small proportion of other bodies, and which, by the process of evaporation, gives at once a good product, which can be easily refined.

"In a word, the elementary operation of the desiccation acts with the power of exorcism; it drives from the juice all injurious substances which were the former causes of evil in this manufacture.

"This fact being once understood, and duly verified by experiments on a large scale, it was then important to bring it to perfection by an easy practical manipulation. This is what the '*Societe d' Encouragement*' is about to undertake, and

that with every chance of complete success. This is already much more than mere expectation, because the problems which it has proposed are already more than half solved, and the entire solution of them is scarcely a matter of doubt: so that the manufacture of the sugar from beets is about to be built on a new basis.

"The '*Societe d' Encouragement*' have offered the following prizes for the promotion of this manufacture:

"1. One of 4000 francs for the best process for the desiccation of the beets.

"2. One of 4,000 francs for the best treatment of the dried beet for the extraction of the raw sugar.

"3. One of 4,000 francs for the conversion of the raw into refined sugar, without taking it out of the mould.

"4. One of 3,000 francs for an analysis of the beet root, &c.

"5. One of 3,000 francs for the invention of a saccharometer, which should be constructed so as to be easily applied, and to have the property of showing immediately the quantity of crystallizable sugar contained in the fluid under trial. A contrivance of this kind, which would be a sure guide for the farmer, and for the workmen in manufactories, indicating to the former the proper time to collect his crop of beets, and to the latter, how to manage his operations, would be of immense value.

When these five prizes are gained, the theoretical and practical renovation of the manufacture of beet-sugar will be radically accomplished in all its forms.

"To the question, *will* this be effected? it may be safely answered that existing facts scarcely allow of the expression of a doubt that such will be the case.

"The problem of the complete and rapid desiccation by an economical process has presented very formidable difficulties. *This drying may be denominated the* CORNER STONE of *the new system;* but this problem is far from being insolvable; on the contrary, it ought to be regarded as solved.

"In one of the last sessions of the *Societie d' Encouragement*, Mr. Beyrand, of Marseilles, presented beets cut in slices, which were dried in eight minutes by the combined action of pressure and heat, effected by two cylinders, heated to one hundred degrees by steam. This result will appear more prodigious when we consider that 100 parts of beets contain 84 parts of water.

"The beets, prepared after Mr. Beyrand's method, preserve all their sweetness. Mr. Schuetzenbach, of Baden, dries the beets by a slow process, probably less perfect than Mr. Beyrand's method; but the result is already excellent, and favors the application on a large scale. In the manufacture of Mr. Schuetzenbach, the beets are cut in small thin slices, and as soon as they come in contact with the air, they bend and roll up, and lose the property of sticking together, which gives the hot air of a kiln, (to which they are brought immediately after they are cut,) a free circulation in all directions round them. The temperature of these kilns is from 30 to 40 degrees Reaumur, (from 99.5 to 122 degrees Fahrenheat.)

"Mr Schuetzenbach's apparatus of desiccation is very economical. The machine for cutting the beets costs only from 400 to 500 francs, and half a horse power is sufficient to put it in operation. Such a machine, when at work every day for three months will cut one million killogrammes of beets, (about 1000 tons,) which would be a sufficient supply for a large manufactory. A kiln, about 10 feet by 9, and 9 feet high, dries, in 24 hours, 3000 pounds of beets, and consumes only 420 pounds of charcoal. Three such kilns would be sufficient to dry all the beets cut by one machine during twelve hours.

"In the manufactory of Mr. Schuetzenbach, the dry beets are reduced to a coarse powder, sprinkled over with lime, and stored away in casks. When the sugar is to be extracted, this coarse powder is mixed with water, which produces a liquor marking 21 degrees on the saccharometer; and when evaporated with Roth's apparatus, this liquor yields, without any other preparation at the first chrystallization, a raw sugar, known in commerce by the name of *bonne quatrieme*, which, after a second chrystallization, becomes a *bonne commune* The advantage of this new method is such, that the beets raised at Esslingen, in Germany, in 1837, (less rich in sugar than the preceding year,) yielded more than eight per cent. of chrystallyzable sugar, instead of five, which was the highest product by the old process; and, in the proportion as the gain on sugar increases, the expenses decrease; so much so, that eight pounds, now obtained, costs less than formerly four or five from 100 pounds of beets.

"Two important points are then attained: *first*, how to dry the beet; and *second*, how to extract the sugar from it.

"To refine the raw sugar, without taking it out from the moulds in which the syrup was placed to crystallize, and which always causes the loss of a considerable quantity of sugar, appears to be a question equally advanced. Recent experiments, on a large scale, show that raw sugar washed in moulds, with pressure, gives, in the short space of three days, a perfect refined article, which formerly required from two to three weeks to effect.

"In regard to the analysis of the beet in its divers states of maturity, nothing has yet been attempted; but this is a task which chemists can at any time accomplish, and the prize held out for it will induce many a chemist to undertake it; and it will not be long before we know to what extent the constituent parts of the sugar-beet develop themselves simultaneously, and which is the most favorable moment for collecting them for the manufacture of sugar.

"In regard to an exact saccharometer, of a simple and practical construction, with the aid of which all manufacturers can accertain, to a fiftieth part, the richness of the saccharine matter in beets, and of all other substances containing crystallizable sugar, the learned researches of a young chemist, M. Peligot, promise great success. Lime and barytes, have the property to combine with crystallizable sugar, and form together an insoluble composition, in which, nevertheless, the sugar does not alter, and is easily separated from it. In bringing this fact to a simple mechanical operation, no doubt is left that the quantity of sugar contained in beet sirup can be ascertained with the greatest nicety.

"The proplems proposed by the *Societe d' Encouragement* are at this time almost solved. It

does not any longer propose to discover a new method, but only to perfect the processes which are already verified by an application on a large scale. Among the advantages which are derived from the renovation of the manufacture of the beet-sugar, is the extension of the culture of the beet-root; because it will be easy for every farmer to send his dry product to any market, far or near, as the weight of the raw beet is reduced, by the process of desiccation, to less than one-sixth part. The beet can now be raised any where, however distant from the manufactory; and, reciprocally, it is possible to establish manufactories in all parts of France, to concentrate them in such places where fuel is plenty and at a low price; whereas, at present, the manufacture is only possible close to a field, fertile enough to produce beets. Another important fact: 1,000 pounds of beets contain 100 pounds of sugar. The price of beets is about 12 francs; the expense of drying and extracting the sugar would not exceed 10 francs, (this is sufficiently proved by experiments;) making the total amount 22 francs. Suppose that one-tenth of the sugar is lost, the manufacturer would have 90 pounds of sugar for 22 francs, or 100 pounds for less than 25 francs. Allowing for small expenses, &c., 50 per cent., the sugar (the refined sugar of this country) could be delivered to the consumer for 38 centimes, (or 7½ cts.) per pound.

"This will create a revolution in the consumption of sugar, as well as in the division of the brances of industry, over the whole globe; then instead of importing sugar from the southern regions it will be left for us to furnish them.

"MICHEL CHEVALIER."

Another proof of the practicability and great advantage of this improvement, is the enthusiasm with which it was adopted and put into operation by the Germans themselves, who are generally very careful and prudent in all their speculations. They have already established extensive manufactories on the Rhine.

The importance of Mr. Schuetzenbach's discovery is best proved by chemical analysis and examination of the physiology of plants. This analysis of the beet-root shows that 100 parts of the root contain—

86.3 parts of water,
3.2 parts fibrous matter,
10.0 parts of crystalizable sugar,
0.5 parts of mucilage.

By the new process, the water in the beet is evaporated, and there remain only 13.7 parts of dry substance, which consists of the sugar, mucilage, and fibrous matter.

The sugar dissolves in cold or warm water almost instantaneously.

The mucilage is insoluble in water; when in a dry state, and mixed with water, it only swells to a slimy matter.

The fibrous matter is insoluble, and has neither in the old nor new process any injurious influence.

From this analysis, we learn that the mucilage is the only substance which causes all the difficulties of the extraction of sugar. The principal process consists, then, in the separation of the mucilage from the sugar. But is this mixture a work of nature, or the result of the manipulations? Or, does the cellular tissue, of which the beet-root is formed, contain the sugar in its pure state, separated from the mucilage?

These are questions as to the physiology of the beet, which were first suggested by Raspail, a French chemist, (in his work on the physiology of plants, Paris, 1837,) and he solved these important problems by the following microscopic experiments.

"When a thin slice of the red beet-root is brought under the focus of a microscope, it will be observed that the texture of the beet is formed of hexagonal cells, transparent, and of a purple color; these cells are crossed by white ones, four or five times longer than the purple cells; this tissue of white cells is crossed again by bundles of opaque cylinders, of a gray color, through which the spirals (*elements generateurs*) are observed.

"When a drop of acid (*acide sulphurique albumineux*, which has the property of coloring saccharine substances purple) is put on this thin slice, the colors change; the part which was purple turns yellowish, the long cells remain white, but the obaque cylinders become purple."

From this it follows that the cells, naturally purple, enclose the coloring matter and the mucilage, and the opaque cylinders the sugar in its pure state. Thus the mucilage in the beet-root is separated by nature from the sugar, and mixed during the manipulation, which caused all the difficulties of the extraction in the old process, when the mucilage was combined with the sugar in grating, pressing, and even in defecation.

To separate this five-tenths parts of mucilage which the beet contains, occasioned not only the loss of considerable sugar, but also labor, fuel, and costly material, as, for instance, animal charcoal, blood, &c.

The new process acts entirely in conformity with the results of scientific investigation, and the whole process is reduced to a simple operation, which gives a sure gain of eight per cent. of white refined sugar from one hundred pounds of the raw beet-root.

The beets are now cut in thin slices, dried before any fermentation can take place, ground to fine powder, so that all cells are broken apart, and mixed with water, which dissolves the sugar before the mucilage begins to swell. The pure uncolored liquor obtained is evaporated, and the sirup brought into moulds to crystallize.

These statements should be considered as a sufficient proof of the infallibility and practicability of the new improvement; and the introduction and general adoption of it in this country would be of the highest importance to the welfare of its population.

Some enterprising citizens of the United States sent agents to France to investigate the manipulations of this branch of industry; but the results have yet effected very little, and the sugar produced from the beet in this country is of no great account, which arises probably from the want of skilful and intelligent operators in the former complicated manipulations. But, at present, in Europe, the manipulations are reduced to a process much *simpler than brewing common table beer*, which can be comprehended and performed by every person. The period is not distant, when farmers will produce their own sugar, or at least raise and dry the beet ready for the manufacturer.

The general argument against the introduction of this branch of industry, that labor is too high in the United States, is incorrect, when we consider the other great advantages which the United States have over every other country on the globe in almost every business, and especially in this branch of industry:

1st. The United States possess a climate which suits the beets better than any climate of Europe, because the summers are excessively warm, which increases the saccharine property of the beet-root.

2d. Plenty of cheap and rich land, subject to but a small tax.

3d. Inexhaustible stores of fuel, from which the great natural water-courses, rail-roads, and canals branch, over the whole union.

4th. Well-constructed labor-saving machines of all descriptions.

5th. An intelligent population, which, when once acquainted with this branch of industry, will soon bring it to great perfection—a population understanding the use and management of machinery, and famous for improvements and inventions. Whereas, in Europe, the land is over-taxed, high in price, and therefore the interest upon it considerable; subject to *tithes* and other feudal burdens, while the fuel is scarce and valuable, and its transportation high and slow. The population are entirely unacquainted with labor-saving machines, and possess very little mechanical ingenuity, while their enterprise is prohibited by the excise laws of their petty governments.

It is obvious that America overbalances with its advantages, the low prices of labor in Europe; and that she is able, not only to provide herself with all the sugar wanted for home consumption, but also to supply other countries.

The sugar now produced in Louisiana, averages only about four and a half pounds per head for the population of the United States, or about 70,000,000 pounds annually, which is but a small part of our consumption, as enormous sums are yearly paid to foreign countries for sugar, as the following table shows, viz:

1832,	imported into the	U. States,	$2,933,688
1833,	do.	do.	4,752,343
1834,	do.	do.	5,537,829
1835,	do.	do.	6,806,184
1836,	do.	do.	12,514,551

This sum will annually increase in proportion as the population augments and their comforts and means improve.

By the adoption of this new branch of industry, the sums at present paid for imported sugar, would be in a short time a clear gain to the country: its agriculture would be improved, and thousands of acres of exhausted and deteriorated land would be again taken up and improved. To procure the necessary manure for this purpose, the farmer would be obliged to increase his live-stock, which would find, during the winter season, plenty of food in the residuum of the manufacture. It would increase the consumption of sugar among the less wealthy class, and would make their condition of life more comfortable, and, of consequence, greatly extend the population of the country.

The manufacture of sugar is not confined to the beet and cane only. In Hungary, there are at present, manufactories which make *sugar from pumpkins*. The following article, translated from the '*Hanoverian Communicator*,' 1837, gives the particulars, as follows:

"A manufacturer in Hungary, for three years past, has used pumpkins for the manufacture of sugar. We have seen raw and refined sugar, also sirup from this manufactory, and found the refined sugar equal to the colonial in every respect. The raw sugar is crystalline, coarse-grained, light-colored, and of more agreeable (melon-like) flavor than the common raw beet-sugar; the sirup is of a blackish-green color, and has also a melon-like flavor, but is suitable for consumption. The juice, obtained by pressure, yields, on an average, six per cent. of sugar. But the water-melon of the south of Hungary is still more productive than the pumpkin of the north. The sugar obtained from the pumpkin is always considerable, whether the fruit has been raised on rich or poor land. The manipulation is said to be more simple than the manufactory of beet-sugar, and requires less attention, as the pulp and the juice may stand for three weeks without getting sour or losing any quantity of sugar. The juice, during the process of evaporation, does not rise in the boilers, and is not so liable to be burnt. The residuum is very good food for cattle. One acre produces 650 cwt. of pumpkins; twenty pumpkins yield sufficient seed for one acre of ground. From the remaining seed a very good table oil of about 16 per cent. can be obtained.

"MARQUARDT."

Indian corn, at the period of tasselling, yields just half as much sugar as the sugar-cane; and it is astonishing that this well known fact did not induce persons to plant corn especially for that purpose.

To make use of green corn and pumpkins profitably, and to improve the crop of beet in quality and quantity, the following plan is, therefore suggested, which would keep a manufactory in operation all the year round:

We know that the beet requires a deep soil, sufficiently provided with decomposed manure, as when planted in green manure they yield much less sugar, and the operation is rendered more difficult; to prepare the field properly for the beet, it should be well manured, (no matter in what state the manure may be applied,) ploughed, and planted in corn and pumpkins, and worked regularly as long as the pumkins leave room for the horse-hoe. When the corn begins to form the tassel, it should be cut off, and the sugar extracted from it. The pumpkin has then all the influence of the sun to come to full maturity, and should be used, when ripe, for sugar. The following year the field would be in first-rate order for the beet, and the following rotation of crops, viz:

Indian-corn and pumpkins, with manure, } for sugar,
Beets, }
Barley,
Clover,
Wheat.

An acre of good cultivated land yields, on an average, twenty tons of the beet-root. Beets were sold this fall, near Boston, for $5 per ton.

One ton of beets yields, when treated after the new method, 180 lbs. of *white refined sugar*. The cost of manufacturing a ton of beets into sugar would be, at very high estimate, $6. One

hundred and eighty pounds of refined beet-sugar would cost $11, or 6 $\frac{1}{10}$ cents per pound, for which we now pay, at the lowest rate, 16 cents.

Mr. Norbert Rilliex, of New Orleans, has recently invented an apparatus for reducing saccharine liquids, which has been patented in the United States, and is already tested.

This apparatus surpasses Howard's and Roth's, or any other invention of this description, not only in simplicity and cheapness, but also in the arrangement in the boiling of sugar, according with the laws of science and economy.

The liquor is reduced by two vertical cylinders, heated by steam, over which the syrup is distributed in small quantities. One of the cylinders operates under a vacuum, and entirely evaporates the condensed liquor by a low degree of heat, to hinder the formation of molasses—an improvement of the highest importance, which, till now, has never been accomplished. The syrup can be reduced to any degree of the saccharometer desired, which is performed by the most ingenious and simple contrivance of a differential thermometer. This apparatus will greatly facilitate the manufacture of sugar, in regard to the economy of labor, fuel, and time, and the perfection of the product. This apparatus will rank among the most ingenious and important inventions.

The production of indigenous sugar in France was one of the main pillars of *Napoleon's continental system;* and the successful extraction of sugar from the beet was relied on as the surest guaranty of its stability.

That branch of productive industry, therefore, which the first statesman and captain of the age, regarded alike as the means of conquest, and the source of wealth and independence, cannot be considered a matter of indifference to the government of this great and growing republic, whose duty and privilege it is to watch over the interest and welfare of its citizens—a goverment aspiring to no conquest, yet whose enviable distinction it is to be regarded as the last hope of freedom—the last asylum of liberty.

The information imparted in the preceding pages, collected as it is from the most authentic sources, it is hoped will be regarded as of the highest importance to any and every government, charged with the duty of promoting the great interests of a nation.

Having traced the history and progress of the manufacture of the beet-sugar, from its first discovery in Europe to the present time, through all its varied experiments and decreasing expenses, until no longer requiring the bounty of government, but yielding a revenue, the only remaining inquiry is, how shall the American people avail themselves of the important advantages of this new source of national wealth and industry?

To acquire a correct and minute knowledge of this new branch of industry, (now practically unknown in this country,) it is necessary to visit Hungary, Germany, France, and England, in order to examine all the recent and important discoveries and improvements relating to the manufacture of beet-sugar. To accomplish this object, it would require the following qualifications:

1. A thorough knowledge of the old method of extracting sugar from the beet, and every apparatus hitherto used.

2. A thorough knowledge of agriculture, in order to ascertain the precise cost of the production of the raw material, the influence which it has on the different systems of agriculture, and the economy in regard to the feeding of cattle, &c.

3. A knowledge of chemistry and physics.

4. A knowledge of the languages of the different countries to be visited, and a thorough acquaintance with technical and vulgar terms in mechanics and agriculture, as well as the *patois* of the countries.

5. A knowledge of mechanics and the art of drawing, in order to be able to delineate any apparatus at first sight, and at a glance, as manufacturers are not always willing to have their apparatus examined minutely.

CHARLES LEWIS FLEISCHMANN,
Graduate of the Royal Agricultural Institute of Bavaria.

PATENT OFFICE,
Washington, December 27, 1838.

Patent Office,
December 28, 1838.

Sir—At the request of the author of the accompanying memorial, I have the honor to submit the same to your care, for such disposition as you shall deem best calculated to promote the wishes of Mr. Fleischmann, and the interests of the country.

Allow me to state that Mr. Fleischmann is a gentleman of varied practical and scientific information, and has been for the last two years a resident of this city, and employed by me in the Patent Office. He is a native of Bavaria, and was educated is the royal agricultural and polytechnical school at Schleissheim, near Munich, at which he graduated with distinguished honor, and was appointed *Inspector of the Public Domain*—an office of great responsibility, and rarely conferred but on men of advanced age; he was also director of the estates of Count Seinsheim, comprising twenty-four villages. Emigrating to this country with much experimental knowledge, and well versed in the French and German languages, he has, at my suggestion, draughted this memorial, which I believe cannot fail to be read with deep interest, comprising as it does, the most important and latest discoveries in the manufacture of beet-sugar, drawn from publications recently received at this office from Europe.

Should the government desire the services of an agent to investigate this subject by visiting the manufactories of Europe, I would respectfully recommend the author of this memorial.

With the highest respect,
I remain your obedient servant,
HENRY L. ELLSWORTH.

HON. MR. LINN, *U. S. Senate.*

From the Edinburgh Philosophical Journal.

DISCOVERY OF EARTH IN LARGE QUANTITY FORMED OF THE REMAINS OF ANIMALCULES.

On the 8th January, 1838, Professor Hausmann communicated to the Royal Society of Sciences of Gottingen, a preliminary notice, on a discovery connected with our own country, which is undoubtedly

among the most remarkable facts lately added to the science of geognosy.

In the month of November, this year, Colonel Von Hammerstein, president of the Provincial Agricultural Society of Uelzen, in the territory of Luneberg, the able author of several prize essays, and the zealous promoter of the agriculture of his native country, had the goodness to send to Professor Haussmann, two specimens of varieties of earth, which were dug out near Oberohe, during an excavation made by the above mentioned society, in the district of Ebstorf. The extreme lightness of these varieties of earth rendered it improbable that they were of an argillaceous nature; but their state of aggregation did not permit us to conclude that they consisted of pure silica, although, notwithstanding this, they really have such a composition, according to the chemical examination, kindly instituted by Dr. Wigners, in the accademical laboratory. The specimen No. 1, according to this investigation, is chemically *pure silica.* It has, at the same time, a fine, extremely loose, earthy, flaky consistence, and a chalk-white color. It has a soft and meager feeling, somewhat like starch, and does not grate between the teeth. On water it swims for a moment, then sinks down, and gradually swells up. Mixed with a little water, it acquires a pasty consistence, without being adhesive. The specimen No. 2, is also silica, but contains likewise a very insignificant quantity of a matter destructible by fire. Its fracture is fine-earthy; the color brownish-grey, slightly inclining to green, becoming darker by the addition of moisture. It is friable, meager, but soft to the touch, and adheres to the tongue. It swims on water for some minutes, but it afterwards sinks, absorbing water with a noise, giving out many air-bubbles, and then expands gradually by irregular splitting of the liminæ, without being altogether separated. When exposed to heat, it rapidly assumed a white color. Here and there it is traversed by veins of pure, chalk-white, fine-earthy silica, filled with smaller or larger cavities.

According to the information communicated by Col. Von Hammerstein to Professor Hausmann, this silica has been found in astonishing quantity in six different places of the above mentioned district, on the edge and first acclivity of the great plateau of the *Luneberger Haide*, covered to the depth of only one foot and a half by the soil. The pure white silica forms the upper bed, and has a thickness of 10 feet to 18 feet. The colored portion is beneath, and has been already penetrated to a depth of 10 feet, without the lower boundary having been reached.

The peculiar state of aggregation of this silica, led Professor Hausmann to conjecture that it might be analogous to the *Kieselgurh*, found in the turf at Franzensbad in Bohemia, and that like that substance, it might be composed of the siliceous shields of infusory animals. A preliminary microscopic examination seemed to confirm this notion. In order to attain certainty on this subject, Professor Hausmann sent specimens to the distinguished investigator of the infusory world, Professor Ehrenberg of Berlin, who, by his extraordinary discoveries, regarding the occurrence of fossil infusoria, has opened an entirely new field of the most interesting investigations. He requested that naturalist to examine these specimens of earth more minutely, with a special view to these objects, and he received, through his kindness, the intelligence, that *both earths are entirely composed of beautiful and perfectly preserved infusory coverings;* that these are very various, but still belong only to known species, and to such as are found in a living state in fresh water at the present day. In the earth No. 1, they are free from foreign mixture; but in No. 2, they are mixed with organic slime, and with the pollen of pines. During even his first examination, Professor Ehrenberg succeeded in determining several species of infusora, whose coverings form this silica, and in ascertaining that there occurs, in the lower bed, a species of infusoria found in the polishing slate of Habichtswald and Hungary; and another peculiar to the *Kieselguhr* of Bohemia; both of which seem to be entirely wanting in the upper bed: but upon these points we shall defer further remarks, in order that we may not anticipate the publication of the completed investigation of Professor Ehrenberg.

That a mass more than twenty feet in thickness should consist almost entirely of the coverings of animals which are invisible to the naked eye, and which can only be recognized with the assistance of a high magnifying power, is an extraordinary fact, and one which the mind cannot fully comprehend without some difficulty. The farther we attempt to pursue the subject, the more we are astonished. That which occurs in an invisible condition in the fluid element, and which cannot be recognized by the human senses, without the assistance of art, becomes, by immense accumulation and solidification, one of the circle of phenomena, which are witnessed by us in the ordinary way; a compact mass is formed, which can be weighed, felt, and seen; and this mass is presented to us in such quantity, that, when regarded only in *one* direction, it surpasses by three times the height of the human figure. Who could venture to calculate the number of infusory animals, which would be required to produce even one cubic inch of this mass? And, who could venture to determine the number of centuries, during which the accumulation of a bed of twenty feet in thickness was taking place? And yet, this mass is only the product of yesterday, compared with the other more compact siliceous masses for which the infusoria of a destroyed creation afforded materials. But what would have become of that loose, light silica—which, by its great porosity, and its power of absorbing water in quantity, in some measure indicates its origin—if, instead of being covered by soil one foot and a half in thickness, it had been covered by a great mass of earth or rock; or, if another power, such as the action of fire, had caused its solidification? In that case, we should have had no bed twenty feet in thickness, but should perhaps have found a compact stony mass, capable of scratching glass, affording sparks with steel, and polishable,—a substance, which, were it not for the abundant evidence furnished by the discoveries of Ehrenberg, it would be still more difficult to suppose had resulted from the coverings of invisible animals. Such a consolidation and hardening of this loose silica, might perhaps be partly accomplished in another way, by making the experiment of employing it for the manufacture of glass, or as one of the ingredients in porcelain; by which means a discovery so very remarkable, in a natural historical point of view, might at the

same time become of practical importance. *Glass formed from the coverings of infusory animals!* Who would, a few years ago, have believed in the possibility of this substance, by whose assistance invisible life in water is revealed to us, being prepared from a material, derived from the same world of extremely minute animated beings; or that we should be enabled, by means of a substance furnished by an invisible creature, to investigate the smallest and most obscure, as well as the largest and most remote, bodies in creation?

[Communicated to us by Professor Hausmann, from the "*Gottingische gelehrte anzeigen*," 25th January, 1838.]—ED. PHILOS. JOUR.

An additional interest is given to the foregoing statement, by the fact, that a deposite of these infusorial coverings, analogous to that above described, has been discovered by Professor J. W. Bailey, of West Point, N. Y.; and they doubtless will be found in no inconsiderable extent in other parts of this country. Professor Bailey says the deposite he discovered is "8 or 10 inches thick and probably several hundred yards in extent, which is wholly made up of the siliceous shells of the bacillaria, &c., in a fossil state;" v. his paper with figured descriptions in Silliman's Journal, October, 1838. We have examined a portion of this "clay-colored mass," from West Point, under the microscope, and witnessed the organic forms as described by the discoverer. G.

Jour. Franklin Institute.

From the Mining Journal.

SUGAR FROM THE PUMPKIN.

A complete revolution is expected to take place in the manufacture of native sugar—a revolution which will probably compel the beet-root growers to "hide their diminished heads." In other words, the pumpkin is about to enter the field as a rival of the beet-root, and to force the Chamber of Deputies to revise its late enactment on the sugar question. We hear that an industrious speculator is on the point of establishing a manufactory for extracting sugar from this over-grown and hitherto despised production of the vegetable world, the first experiments on which, it is added, have been crowned with complete success.

A CHEAP AND CONVENIENT MODE OF BORING FOR MARL.

To the Editor of the Farmers' Register.

I inclose $5 for Vol. 7, of your very useful Register, and along with them, a lame account of (what I think,) a most excellent implement for boring for marl, or for searching into Mother Earth after many of her hidden treasures; and of which, if there was any merit in so simple a contrivance, I should say I was the inventor.

It consists of a $\frac{5}{8}$ inch square bar of iron* of any required length, with a $1\frac{1}{4}$ inch barrel-auger welded to one end, and a handle of iron, having a mortise to fit the rod very loosely, so that it can slide up and down at pleasure; and a thumb-screw at the side of the mortise in the handle, to fix it at any required height. In forging out the rod, the smith should make with his punch, indentations about a foot apart along the whole length, to receive the end of the screw. So much for the borer. If more than 10 feet be required for the length of the borer, it will be necessary to support the upper end, otherwise it will waver in boring, and prevent the rod from going down perpendicularly. Now to comprehend my fixture, you have only to imagine a large over-grown four-legged stool, over-topping the operater's head about a foot or so, with a hole in the center of the seat through which the rod passes. The legs to be stout and far apart, and going quite loosely through the holes in the seat, with good shoulders for it to rest on. Two of the legs on one side to be fully two feet longer from the shoulders up than the others, so that on the side of a hill, you can preserve the level by lowering the long legs and driving a nail under the seat into each leg, and thereby forming a shoulder. If 20 feet of rod be required, (which is the length of the auger I have in use,) you must put another four-legged stool of light materials and smaller dimensions, about six feet high, upon the top of the first, securing firmly (by mortise) its legs at top and bottom. From the centre of the upper stool, a tube, (made of four strips of thin plank, tacked together,) descends to the seat of the lower stool, and is mortised into it, through which tube the rod passes up and down, and is always kept in place. If more than 20 feet be required, you have only to continue this tube up as high as necessary, and brace it to the seat of the upper stool. The operator has but to turn the handle and he is surprised at the rapidity with which the rod descends, owing to its weight; and he should not bore more than two feet at a time before withdrawing, always relaxing the thumb-screw, and letting the handle fall to the ground before pulling up the rod. The great improvement here suggested, consists in the *moveable handle* upon a continuous rod of any reasonable length, thereby dispensing with screw-joints and other contrivances, which are costly to make, and troublesome in their use. The fixtures to keep the rod plumb, may be varied according to size and great lengths required; but for 30 feet, you will find the above not a bad contrivance.

If you think so poor an affair deserves a place in your Register, you can dispose of it that way; but if not, I shall be nothing daunted, and may *bore* you again another time.

Yours, NOUS VERRONS.

* I find this rod large enough.

ANALYSES OF SUNDRY SPECIMENS OF CALCAREOUS ROCK, OR MARL, IN S. CAROLINA.

To the Editor of the Farmers' Register.

Bristol, Pa., Jan. 28, 1839.

In giving you a number of localities, where the earthy or other loose aggregated carbonates of lime are to be found to the south, I omitted to give the analysis of many of them; and as this subject, through your writings, is now becoming of importance, they may be acceptable to some of the readers of your Register.

I observe that my good old friend, Dr. Cooper, is pleased to censure my use of the term "marl"—which is all right. In using it, I did but comply with the common idea, that marl is any earthy material whatever, which imparts or give fertility to soil, being used in contradistinction to manures, which are vegetable or animal, or mixtures of both

and also to salt, gypsum, &c., which may be considered in the light of *stimuli*, intended to increase life, as they do galvanic action in our piles and batteries. When a student in France, and as a lecturer, I adopted the French idea of marl, which was this, that any rock, or earthy substance, which by exposure to the air lost its cohesion, and crumbled into earth, which may be subdivided into calcareous and argillaceous, as either clay or lime predominated.

Among the important and interesting deposites of earthy lime-stone to the south, is Shell Bluff, on the Savannah river, about twenty five miles below Augusta. This bluff rises fifty or more feet above the river, consisting of alternations of carbonates of lime of various degrees of impurity, with beds of clay and of sand. The upper bed is about six feet thick, containing abundance of the gigantic ostrea, which were collected and burnt for lime.

The first bed below the oysters we shall call No. 2, this consists of carbonate of lime,					77.6
And fine parts ferruginous clay,					22.4—100.
The next below, each being in the descending order, No. 3, of carbonate lime,					60.
Fine quartz sand and a little whitish clay,					40. —100.
No. 4.	83.2	carb. lime, and	16.8	of coarse quartz sand, and very tenaceous yellow clay.	
5.	93.4	" "	7.6	yellowish argil, no sand.	
6.	64.4	" "	35.6	white glassy quartz sand, with whitish clay in small quantity.	
7.	54.4	" "	45.6	yellowish glassy quartz sand, being stained with iron.	
8.	85.2	" "	14.8	glassy sand and yellowish earth.	
9.	47.2	" "	52.8	glassy sand and yellowish clay and ochre.	
10.	37.2	" "	62.8	light olive colored clay, fine and coarse.	
11.	73.2	" "	26.8	coarse glassy sand, with a little yellowish clay.	
12.	62.4	" "	37.6	coarse glassy sand, with a little yellowish clay.	
13.	73.2	" "	26.8	sand and clay, the former coarse, the latter in small quantity.	
14.	47.2	" "	52.8	sand and clay.	
15.	71.6	" "	28.4	light yellow clay, very adhesive.	

The earthy lime-stone on Mr. Darby's plantation, in Saint Matthew's Parish, S. C., of which I then noticed two kinds, gave by analysis, the first, 92.2 carbonate of lime, and 5.8 clay and iron, the former not very tenaceous or adhesive, the second, 90.4 carbonate lime, 9.6 clay.

The same kind, but at some distance in Orangeburg district, belonging to Dr. Jameson, presented by analysis, 91.6 carbonate of lime, and 8.4 clay, dark colored and plastic; the color was owing to animal matter in great part. This earthy lime-stone was quarried and burnt for lime.

The object in all these analysis was the quantity of lime; the other information, at the time, being of no manner of use, nor will be, excepting for speculative geology, and at a remote day.

LARDNER VANUXEM.

SUGGESTIONS FOR EXTENDING THE USE OF LIME AS MANURE IN VIRGINIA. THE COAL TRADE.

To the Editor of the Farmers' Register.

The ability with which the subject of using lime is treated by the various practical farmers, who contribute to your valuable periodical, precludes the idea that I should be able to say any thing in its favor, which would induce those who do not use it now, in future to commence; but I do not despair of giving such information that if followed, will furnish lime to upper Virginia, at least on much better terms than formerly, and increase the amount with those who now use it. Until our stores of lime-stone in the upper regions of the state are unlocked, we must look abroad for the present and future supply, as heretofore; and it is to the reduction of rates from this quarter only, that my plan is to operate upon. The usual or minimum price of lime, per cask, is about $1 75, sometimes it reaches $2 50, and expenses to be added, which deters many from its use, while if at $1 per cask, the same or more money might be laid out, and double results might be expected.

Lime is usually brought out as ballast; and the reason is obvious, for a vessel coming to Richmond, can always find a load of coal for some port, and thus, if only half freight for lime can certainly be obtained, it would come most freely.

Plan.—Let each farmer calculate how many tierces he intends consuming, and write to some one who is not too much burdened with business to attend to it, enclosing the money to buy, say 50 casks, when it can be bought at $1 to $1⅛. We will suppose 1000 persons to join, and the order will reach 50,000 casks. Each to have a portion sent to him from every cargo. Let it once be understood that the farmer's price would be certain to be $1 for every cask brought here, and, my word for it, we should be well and constantly supplied; the advantage would be, that the storage and all second-hand charges would be thus avoided; for the summer, when little is doing in freights, would be the time to carry up and receive the lime. Our rail-roads have most liberally put down the rates of every improver of the soil to the bare cost of carriage; and I do not hesitate to advance the opinion, that when our packet line of boats to Lynchburg, (the capital of which is $20,000, and mostly taken) gets fully into operation, arrangements of the same kind will be cheerfully entered into; for every cask of lime thus carried, would add at least four or more casks or barrels of produce to be returned in the same boats at a future period.

While I have pen in hand, suffer me to digress from the service of lime, so far as to make a remark upon the value of our coal trade to the state.

Owners and shippers of produce in New Orleans, very frequently ask the captains, or in other words, give them the choice of New York, Philadelphia, Baltimore or Richmond; and in many, *very* many cases, the latter is chosen for the reason, that much of the carriage is done by Egg-harbor and other northern vessels, and going south, they take out their various "notions," and wishing to go home, prefer Richmond; for here they can always get a home freight of coal, and in any other port, they most probably would have to go in ballast. It is to this cause, mainly, that Richmond can now compete successfully with

those cities, in sugar, molasses, bacon, lard, &c. and give the purchasers their supplies as they want them; requiring thereby, less capital to do the same business with, than if bought at the north, in anticipation of the trading seasons.

J. H. D. Lownes.

Richmond, Feb. 8, 1839.

PREPARATIONS FOR SILK-CULTURE NEAR GEORGETOWN.

To the Editor of the Farmers' Register.

Georgetown, 1st Feb., 1839.

I shall have, if my roots and cuttings succeed as well this year as the last, from 300,000 to 500,000 Chinese mulberry trees next fall, from six to eight feet high, and abundantly supplied with branches, as I shall give them room enough. I am now building a laboratory for the worms to do their work in, 50 feet by 20, 2 stories. This for a beginning, to feed one million of worms next summer. I shall enlarge it next year to the extent required to feed all the leaves I can grow. I have taken measures to procure silk-worm's eggs from France, which I expect to arrive about the 1st April. I have ordered them of the best description, and shall probably have some pounds to dispose of. Your obedient servant,

J. Mason, Jr.

For the Farmers' Register.

FAILURE OF EXPERIMENTS. MODES OF KEEPING SWEET POTATOES.

It is as useful to the agricultural reader, to learn the failure of any experiment, produced by the suggestions of reported success, as it is to hear of its having fully performed all that was ascribed to it. I am induced to make this observation, in consequence of seeing it stated, some short time back, in the Register, that if twigs from an apple tree be inserted in an Irish potato, and placed in the ground, that the twig would grow and flourish, and become a living tree. A friend of mine performed this experiment. He carefully, as directed, inserted a number of fine twigs in an equal number of Irish potatoes, and watered them, whenever it was necessary. But, lo! the twigs all died, whilst the potatoes grew and flourished.*

I have met with another failure in a highly recommended species of corn, the "Baden or twin-corn." I have cultivated this corn for 2 or 3 years, being induced to do so from the many panegyries bestowed on it; but I am led to the conclusion that it will not answer, except on very rich land, and in such land any species will produce well. The objection I have to the Baden corn, is, that it sends out a great number of shoots, or as our farmers term it, "over-shoots itself," and consequently, not one of them attains perfection and makes a good ear, unless the land be uncommonly good; and even then, not over two ears fill out, whilst the remainder amount to little or nothing.

A correspondent in the Register desired to know how sweet potatoes can be kept through the winter months. This is a secret, I can assure him, well worth knowing. I can inform him of the method adopted in the lower section of Virginia, most famous too for its sweet potatoes. This winter, many persons have already lost their potatoes, in consequence of having heavy rains about the time they were dug, which, by being saturated with water, brought on the rot after they were put up.

There are two methods used for putting away sweet potatoes. One plan is to build a small house of brick, sunk one or two feet in the ground. The size of the house to be in proportion to the wants of the farmer; they are generally 7 or 8 feet square, with a small door opening to the south, and a brick left out in the north end, to be stopped or opened as it may be necessary to give them air. When the potatoes are put into this house, some clean dry pine leaves are put over them, as well as under them.

The other plan, which is much the most common, is to put them up in hills out of doors, as follows. A bed of pine-leaves is laid down on the ground about a foot deep, the potatoes are then placed upon it in a pile of a conical form; a covering of dry pine leaves is then put all over them a foot thick, and then dry earth thrown over the whole about 6 or 8 inches thick and carefully patted down with a spade. Some leave an aperture at top, and insert an oblong box, 4 inches square, down to the potatoes, and lay a piece of plank over the outer orifice, which is to be removed in warm days to admit air, as it is considered that much heat is injurious. If these hills be not made with much care, the frost will reach the potatoes and destroy them. To prevent this, I have, for several years, put up my potatoes in such a hill as I have described, made in my cellar instead of the open air; and so far have never failed to keep them, as it is impossible for them to freeze. A heavy rain has lately fallen, and some water got into my cellar, and I fear it may injure them.

Peter De Quir.

For the Farmers' Register.

MARL. MARL INDICATOR. PROLIFIC CORN. SUCKERS. SEED. DEEP CULTURE THE SECOND TIME, PARTICULARLY IN DRY SEASONS. NINE-LOT SYSTEM.

While I make a remittance to the editor, I will also take occasion to offer a few ideas to the readers of the Register. I think it highly probable, that they will not be considered very valuable; and many will think that they had as well not have been published. But this opinion should be resisted in this, *our day* of small things, with due fortitude. It is a sort of "besetting sin" of the eastern Virginian, (and of the southerners generally,) that if he cannot exhibit, or do that which is "first rate," he will do nothing. And while the Register is waiting for its contents to be made up of all the necessary exhibitions of *perfection* in the art and science of agriculture, its editor is put to his "wit's end," in writing, copying and extracting, for the edification and pleasure of its numerous readers, all expecting him to form, for their hungry appetites, a feast of full variety. And

* Our correspondent might have seen in the same No., by our comments on the piece referred to, that it was not selected for republication, for its supposed truth, but to expose its worthlessness.—Ed. F. Reg.

why will they not help? Because they cannot surpass every body else; because some more ignorant reader, or less willing contributor, may happen to say, "this is not new, I knew it long ago." While then we aim at perfection, let us remember that the end is to be attained by gradual improvement. Let us not be ashamed of small things, great ones were never yet possessed without them. By the use of twenty-six letters, which were at first only *sounded*, without vanity, pride or shame, the most extraordinary developments of the human mind have been accomplished. Let us do likewise. We should all have cause to rejoice to see the Register filled monthly with what we have *seen, heard and done;* particularly in our own state, and more especially in the eastern part of it, for we need most. But as to what *I* have done, seen or heard.

I did not commence the use of marl on the place where I live at this time, until 1837. Its effects, consequently, have been observed but on the two succeeding crops; they are good. I think that I may with confidence assert, that I have seen as much as one hundred per cent. produced in the product of poor land. All, however, are not yet convinced of the value of marl. Becoming zeal on the part of its users will sooner or later bring it into general use. I think it probable that many are prevented from using it on account of the burden imposed by the example of those who are applying or have applied it. They are unwilling to begin so heavy a job, as it would be to put from three to five hundred bushels of marl to the acre. I find that no difference in crops can be discovered from like land that has been marled at small and heavy rates. Some ten years ago, I marled a small farm with very strong marl, at the rates of seventy, and six hundred bushels. The result was, that the last was injured, while the first was equal to marling, at any rate, between those extremes. I now consider, that marl, which contains from sixty to seventy-five per cent. of lime, should seldom be applied in a quantity greater than one hundred and twenty bushels to the acre. When the land will bring now five barrels to the acre, one-fifty may be used. The marl I use is from what is called the lower deposite. Some beds are highly calcareous, while others have but a small per cent.; and one kind into which I have dug, has no lime. This appears to be of a dark "bottle-green" color, and is what we call about here, "green sand," though much finer, and considerably different in appearance from the Pamunky "green sand" marl. I am not yet able to report on the effects of this deposite. Over my strongest marl, I often find an over-layer of what is called "blue-fuller." I think it what the English call "fat marl." I was, at first, at a loss what to do with it, but found, on trial, that it was highly serviceable when applied with the shelly part. It appeared to increase the corn-crop nearly fifty per cent. above the simply marled land. That mass of blue was once shells, I think, which were dissolved by the acids of our hills. Some minute shells are still undissolved in it; it abounds most, under oozing hill-sides.

Besides the blue mass, I have tried the swamp over-layer, or mud. Its effects are also very good with the marl. I tried this on some four or five acres alone, last year; but the season was too dry to enable me to judge of it; it must wait for another crop.

I think that I have perceived a manifest difference between the dry beds of marl, and the marl of the lower deposite, in their operation on the *natural* grasses. Both kinds will expel the *poverty* grass; but the higher kind will greatly lessen the crab and fox-tail grasses, both valuable; while the lower deposite seems to promote the growth of both of these. I am sustained in this observation by others, and men of experience. It may result from the application of too much marl, perhaps added to rather too deep ploughing. Close grazing also helps, no doubt. But I have thought that the lower marl contains a salt, not possessed by the higher, which acts as manure, not only to the grasses, but to the crops. This salt can be observed to cover every lump of marl which has been exposed for a while to the atmosphere, as an efflorescent white coat. In an analysis rudely made by me, I lost about 24 per cent., which appeared to have gone off in the solution. I am pretty certain, that this salt, is not "green sand." I sent a sample of marl to Professor Rogers, requesting him to analyze with reference to it, but he evidently overlooked it.

A word as to the "marl indicator." In a back number of the Register, some curiosity was expressed in reference to its discovery. It seemed to be thought highly important. It was suggested, as well as I recollect, that it had been credited to Dr. Westmore, which the doctor declined. I should be glad to know who indeed first noticed the connexion between this plant and the existence of marl. In reference to the matter, I will state, that I distinctly noticed the fact, and constantly, for many years, urged the importance of it upon the public, from the year 1823, when I first commenced the use of marl. I had never heard of it before my observation of it. Finding that it never failed to indicate the presence of marl, or lime, in some form, I considered it highly valuable. While I entertain the hope, that many will yet be benefited by the discovery, I make these remarks merely to ascertain whether any other person had noticed the fact before me.

I am trying the *prolific corn*. The seed were obtained of James M. Garnett, Esq. The first seed were planted in a corner of a field, and of course, received a cross of a large white kind of corn, which grew partly round the corner. I did not like the first crop very well, but concluded, notwithstanding, to extend the crossed-seed to half my crop in 1837, in comparison with a very fine large white corn of the neighborhood. The test lands, particularly, two acre-lots near the house, were not precisely equal, but nearly so. The prolific lot was too thick, (a great mistake as to that corn, it requiring, from acclimation, more distance than is usually given,) and consequently it fired considerably, but yielded eight barrels, one bushel and a half to the acre; while the other gave a product of only twenty-nine bushels. The two lots were immediately contiguous, so as to cross again. From this second crop, being convinced that the *prolific* suited me, notwithstanding the fault-finding of many who had tried it, I took my seed exclusively. My last year's crop was of that kind. I find that weak land, such as mine, in general is, cannot produce a very large corn; and if it be made able to bring the largest to perfection, it will certainly give a fair return of the smaller varieties. Many of those who have fallen out with the *prolific* corn,

are at fault themselves; expecting an unreasonable return, and planting too thickly. But the prolific delights exceedingly in something *stimulating* and *nutritious*. It is weaker in draught than the large corn, which is proved by the fact, that if they are planted in alternate rows, the large corn will beat it readily. Good authority, in my neighborhood, asserts, that a better crop of wheat follows it, than will follow the larger corn, which sustains my observation. I think that the prolific corn will recover its reputation after a while, unless we can find a better. I shall plant a few acres of the genuine Baden corn this season, received from Thomas H. Baden himself.

I have tried the "*corn-sucker*" question too, and would in reference to the matter say, that to insure in this climate, a good return of sucker-corn, we should have a very rich soil, which must be deeply ploughed; the seed should be planted at something like double distance, the crop thoroughly cultivated, and have an unusual supply of rain throughout July and August. Without these prerequisites, *much hope*, but *little corn* will our fields produce. I should call this a *humbug*. I think it, and am satisfied. With the two parent stalks, I had sometimes as many as nine stalks, from seven to ten feet high, standing at about five by three feet distance. But lacking the great prerequisites, and finding that both parents and children would *perish*, in the midst of the season, I thrust in the knife, cut off the suckers, and so, succeeded in earing the stalks only tolerably. Theory and fact will sometimes disagree.

Of seed-corn. I commenced a trial of the comparative value of seed from the top, and from the under ears of the most prolific stalks. The season was so dry last year, however, that it left me in great uncertainty. I felt glad to find even one on a stalk. Thousands had none. The observation made by me, however, led me to prefer the top ear. Whether it is more productive or not, time may yet prove. It is generally larger, and is probably more perfectly matured, if we understand the philosophy and physiology of the corn-plant.

Of the corn-culture. What I have now to offer, is neither my own nor new, but it seems to me to be very valuable. An excellent manager in King William, Mr. John Luckhard, has probably for many years practised it, besides many who have received it from him. Not to go into the minutiæ of the culture, I wish to state, that the most successful plan, (circumstances considered,) consists in "*siding*" the corn, [turning off the earth from the stalk,] with four furrows, which is generally done in stiff land—the last two being very superficial. The hoes now clear the plants of grass by a cross-wise stroke, so as to remove it from the top of the bed; this is followed by the usual course, of what is called throwing dirt to the corn. And then comes the plan proposed. Instead of the introduction of the cultivator now, the *plough* is continued, running the first furrow near the corn, but *very superficially;* the next is to be deeper and so on, until the whole space is thoroughly broken. The corn, during this last ploughing is large, too large, many think, to bear such treatment. But this appears to be the only successful course for a *dry* season. It will succeed well in a wet season also, but its peculiar value is owing to its effects in the absence of rain. Those who advocate the level system of culture will object to the probably high beds, which will result from twice throwing dirt to the corn; but we again appeal to experience, to *fact*. Many cases, of the most striking character, can be adduced in this quarter in proof of the correctness of the practice. Thorough-cultivation seems to be all-important in a *drought*, while it is admitted that the superficial plans will answer well in ordinary seasons.

Lastly of the nine-lot system. The opinion of the editor, is respectfully requested as to the propriety of the plan. For the improvement of an exhausted farm, I have divided it into a standing pasture, and nine other parts for cultivation, viz: two parts to be in cultivation every other year in corn, to be followed by wheat. These contain between forty and sixty acres each, are marled, or nearly so, and are to receive all the manure that can be raised—dry leaves, soil from the woods, and swamp-mud, excepted, which will be put on other lots also; so that the rotation and treatment are, manure, corn, wheat. Then come three lots, to be cultivated in corn, wheat and oats, clover, with help from the woods, swamp and marl. These will contain only about twelve acres each. The balance of the arable land will make four lots, to be improved by marl, &c., and cultivated in corn, wheat, &c., and clover. Under this system, I work one of each of the lots annually. I think the four-field system possessed of some advantages over this, but it also, has its objectionable points. My greatest difficulties are to be found, I fear, (for I only commenced it last year,) in support for my stock in summer, and the uncertainty of getting clover to "stick" or take on poor land. Without marl, there would be no hope of it. It is my opinion, which is based on last year's trial, that such land can be restored by repeated pea-fallows, green, sooner, and at a smaller expense, than it can be done by clover. I obtained a fine fallow of peas after wheat, last year. The editor will please give me his opinion, or advice as to these matters.

J. Du Val.

King & Queen county, Feb. 2d, 1839.

From the London Horticultural Journal.

ARTIFICIAL MANURE.

The Horticultural and Agricultural Societies of Paris have lately been directing their attention to the value of the receipt left by M. Jauffret, for making artificial manure. It was at the request of the minister of agriculture, that the Royal and Central Society of the Seine undertook the examination of this question: and M. Quenard having, about the same time, laid before the society two modes of fabricating manure, different from M. Jauffret's plan, it was determined to compare the respective plans together, and determine on their relative utility. M. Quenard is secretary of the Agricultural Society of Montargis, and is esteemed as an experienced cultivator. One of his manures is a species of compost, and the other is analogous in principle to the preparation of M. Jauffret. As this subject is considered of great importance in France, we have thought fit to lay before our readers a concise account of M. Quenard's method of proceeding, premising that the commissioners appointed by the Royal Society of Paris have not yet given in their report.

The mode of preparing the compost is simple enough:

1st. A layer of green stuff taken from a pond.
2d. A layer of quick-lime, ashes, and soot.
3d. A layer of straw and green grass.
4th. A layer of quick-lime, ashes, and soot.

These layers are repeated until they reach a cart load at least. Holes are then made through the several layers, and a quantity of water is introduced, sufficient to saturate the mass, and cause a thorough mixture of the vegetable matters with the alkaline and sooty substances. According to M. Quenard, this produces a perfect compost. The second preparation differs from the other, inasmuch as the dissolution of the alkaline substances are first obtained by means of a prepared lye, which is used to saturate the matters which are to be transformed into manure. The following are the proportions to be used in turning 1500 lbs. of straw into manure. In a vessel, possessing greater breadth than depth, pour in—

1st. 800 pints of common water.

2d. 125 pints of oven-ashes, if they can be procured, as they have the property of potash to some extent; if not, you must use the common ashes.

3d. 75 pints of soot, if possible, from kitchen chimneys, for this soot contains more of animal matter, and is more soluble in water. This mixture must then be well stirred up, and made to incorporate.

4th. 20 pints of powerful lime, which must be first slacked with the usual quantity of water.

The whole of this must now be well stirred together again so as to insure a perfect amalgamation of the several matters. From time to time, during twenty-four hours, this mixing must be renewed, and at the end of that time, the dissolution of the whole will be effected. This liquid will be found exceedingly powerful, and capable of producing fermentation. Plunge into this liquid, while moved quickly about, in order to hold suspended the insoluble particles which usually settle at the bottom, the quantity of vegetable substances, which it is desirable to turn into manure—no matter whether they are dry or green, easy to be dissolved or refractory, in with them. When they shall have been well saturated with the liquid, place them in a trench, prepared beforehand, with a channel through the side, to let the superfluous moisture run off. This you can receive in vessels, as it will be of use again. As many layers of the stuff thus perfectly wetted may be placed as may be required. Care must be taken to stir the liquid well, each time that new vegetable substances are put in. As each layer is put on the heap, it should be well beaten down. The more the whole mass is united together, the quicker will be the result. At the farthest, the delay never exceeds 16 or 18 days, according to the temperature of the place. The heat may be increased, and the fermentation quickened, by surrounding the heap with whatever substances may be lying about. At the end of three or four days, the heap is wetted with the liquid, from time to time, up to the sixteenth or eighteenth day, when the manure is found ready for use. It is important to preserve a certain quantity of the first preparation, to mix with the mass afterwards, to promote fermentation. Time and quality will both be gained in this manner. This part of the liquid, thus preserved, may be considered, for manure-making, what mother is in vinegar, yeast in beer, or baum for baking. M. Quenard declares, that he has for years tried this preparation, and that it never, by any chance, has been found to fail. We place it before our readers, leaving them to try the experiment on a small scale.

From the Journal of the American Silk Society.

EXTRACTS FROM THE PROCEEDINGS OF THE SILK CONVENTION.

ON THE FITNESS OF THE UNITED STATES FOR SILK-CULTURE.

Mr. G. B. Smith, of Baltimore, said, with the consent of the convention, he would offer a few remarks in support of the resolution now under consideration. That silk may be grown in all the United States, not only for domestic purposes, but as a valuable article of commercial export, he knew from his own experience, and from the testimony of the most respectable people in every state in the union. I have now, said Mr. S. been twelve years engaged, more or less intimately in this business. For seven years, I kept an experimental cocoonery, for the express purpose of obtaining and diffusing information on the subject; and during the whole of that time not a single instance of its failure had been made known to him, which could in the remotest degree be attributable to either climate or soil. On the contrary, he had been able to prove, conclusively, that the climate of our whole country was better adapted to the silk-culture than that of any other county, except China; and ours suffered nothing in comparison even with that. The great desideratum in a climate suitable for the most successful production of silk, said Mr. S. is *dryness;* and the more marked the climate of the country in this respect, the better is it adapted to the silk-culture; and the further it is from it, the less is it fit for the business. If gentlemen would take the trouble to examine the writings of the Chinese, as translated into French and thence into English, and embracing a period of upwards of four thousand years, I believe, they would find that a dry atmosphere has always been considered essential to the silk-business. He had found it necessary in this place, to employ stoves to expel dampness. He considered England nearly equal to France as to temperature, but the atmosphere is too damp for the successful culture of silk. Even in Ireland, where the climate is much more salubrious than that of England, and the temperature unobjectionable, the culture of silk cannot be pursued. He had been surprised to see a publication made in the north of the successful use of even wet leaves—leaves even dipped in water. It had been stated, that worms fed with leaves thus wet, had made better silk, and more of it too, than when dry leaves were used. He begged to caution this convention against the practice. It might succeed in a single experiment, when all other circumstances combined in its favour; but as a regular practice, it was highly dangerous. He had twice lost his whole brood of worms from feeding with leaves only slightly wet with dew. On the contrary, he would make a fire in his cocoonery in even damp weather, no matter how warm the weather might be, and especially at the time the worms were

beginning to spin their cocoons. At this period, a dry atmosphere is absolutely essential to the formation of good silk. In damp weather, the cocoons will be soft and flabby, the fibre cannot dry speedily as it is spun by the worm, and the consequence will be an inferior article.

That silk may be cultivated in *any* part of the U. States, is proved by the fact that we want but six weeks of warm weather for the purpose; and what part of our happy country is there, asked Mr. S., in which we have not six weeks of hot summer weather?

Mr. Smith pointed to a morus multicaulis tree, standing at the extremity of the hall, four or five years old, and grown in the state of Connecticut, unprotected from the inclemency of the winters, and yet it was uninjured; and alluded to another which had remained uninjured upon the brow of a hill at Hyde Park, on the North river, state of New York, for five or six years. [It has indeed been there since the spring of 1830, as it was given to Dr. Hosack, by Dr. Pascalis, at that time,] and yet it remained perfect, not a bud had ever been killed. Mr. S. said he knew that silk could be made from the morus multicaulis in almost every section of the Union, and as we were but just entering upon this important branch of industry, which he hoped yet to be able to call American industry, it was of the utmost importance that we begin right. We have no prejudices to contend with, no old orchards of other trees to get clear of, no bad habits to eradicate, as in Europe.

We are asked why they do not make silk from morus multicaulis in Europe. The reason is obvious. They must in the first place go to a very considerable expense in the purchase of the trees, as we have to do; but in addition to this, they have their old over-grown white mulberry trees to dig up and throw away. Besides this, in Europe, generally, the landlords own the trees and sell the leaves by weight to the surrounding peasants to feed the worms with; and so long as they can sell their white mulberry leaves, they will not be very likely to destroy the trees for the purpose of replanting their grounds with the multicaulis, and especially so as they will not derive much if any advantage from it. Another reason why they do not make silk from this tree in Europe, is, the trees are all in possession of the nurserymen, who propagate them for exportation, for which they have a demand at high prices. The probability is, that at this day, there is not one hundredth part as many plants in France as in the United States. But neither in France nor in the United States, will any one make silk while they can sell the trees at the prices now current in both countries.

Mr. S. related a series of experiments in feeding from fifteen varieties of mulberry, in 1830, viz: the morus multicaulis, the Tartarian, the white mulberry, (several kinds,) common wild mulberry, &c. &c. the result of which, fully convinced him of the superiority of the morus multicaulis. The worms preferred it, the cocoons were larger, and the silk better and stronger. He then tested the strength of the silk from different varieties of the mulberry, by suspending weights to each till it broke, and in every instance, he had found that from the multicaulis to bear more weight than any other kind. The native mulberry produced silk next in strength to that from the multicaulis, and the Tartarian next. But the difference was extremely slight. He believed it did not amount to more than three or four per cent. between the strongest and the weakest.

Mr. S. asserted that the multicaulis was not a Chinese tree. There was in the Phillippine Islands, it was true, a tradition that a colony of Chinese who emigrated to those islands, had brought the tree with them secretly from China; but various orders had been sent to China for it, but the tree had never been found there. The white mulberry, said Mr. S. is a native of China, and not of Italy as is generally supposed. We had no doubt taken the idea of its Italian nativity from the fact of its extensive use in that country. The seed derived from China is white mulberry seed, in some of its varieties. And here, said Mr. S. permit me to state a fact in relation to such seed. The white mulberry "*plays*," as the gardeners express it, into more varieties than almost any other tree when raised from seed. I have seen a bed of seedlings all from the same parcel of imported seed, from which might be selected an hundred different varieties. It was a singular fact, that white mulberry seed raised in this country did not thus play; its produce were almost always the same as the parent tree.

Mr. S. spoke favourably of the Alpine mulberry and of the Brussa, the latter being what he formerly had in his grounds, and used for feeding worms, under the name of the "Constantinopolitana." The word "multicaulis" was adopted by the Linnæan Society of Paris, as being descriptive of the specific character of the tree, which is many-stalked; that is, numerous stocks grow from the crown of the roots, like those of the lilac, hazle, &c. The first introduction of the name multicaulis, into this country, was in the early part of 1830. Three of the trees were sent to the late Dr. Pascalis, of New York, under the name of morus multicaulis, with a detailed description of the tree and its botanical characters. Dr. P. sent the pamphlet containing them to me, and I at once discovered that the descriptions and drawings applied exactly to my Phillippine island mulberry, as we then called it, which had been in my possession for some time, presented to me by my friend Mr. Prince, of Long Island. This tree is still in my possession.

In reply to several questions from different gentlemen, Mr. S. stated, that he had found his worms, fed upon the multicaulis, as healthy as those fed upon other varieties of the mulberry. The soil best adapted to the multicaulis, is a slight sandy loam, or gravelly soil; the situation should be high and dry, with a northern or north-western exposure, and no protection. Indeed he would select the coldest and bleakest hill-side for his multicaulis. When protected by a wall or close fence from the northern blast, they have been frequently killed; but if planted upon a high and dry ground, where water cannot stand about the roots, and exposed to the north, they can hardly be killed. They should not be grown upon low or rich ground; they become too succulent, and grow too late in the fall. Mr. S. said that his tree had always been perfectly naked of leaves and the wood perfectly ripe to the topmost buds, before ice began to form in the fall. He objected to a clay sub-soil, as it would retain too much water, and expose the roots to injury. He related an interesting experiment which he had tried in feeding with fifteen varieties of mulber-

ry leaves; the worms uniformly preferred the multicaulis, or, as it was then called, the Phillippine island mulberry.

From the Journal of the American Silk Society.

STATEMENT OF PRODUCT OF SILK, MADE BY THE REV. WM. MC LEAN, OF NEW JERSEY.

Much doubt having been entertained by our farmers and others, whether the production of silk could be made profitable in this country, the Monmouth County Silk Manufacturing Company, of New Jersey, last spring, offered a premium of eighty dollars to the person who would produce the greatest number of pounds of cocoons from the sixteenth of an acre.

In order in some measure to test the matter of profit, with reference to this premium, and anxious myself to see what could be done the first season, even by the most inexperienced, I measured and planted with the morus multicaulis the sixteenth of an acre.

The ground was laid of in a parallelogram form, about thirty by ninety feet. The soil was not rich and not more than two ordinary loads of manure, worth one dollar each, was put on the lot. I planted roots the growth of the previous season, in an upright form in rows eighteen inches apart, and the trees about ten inches apart in the rows—twenty-three hundred and twenty roots in all. The ground was by no means suitable for trees, being a cold heavy clay, they were accordingly small—not having attained an average of more than three feet the whole season. The roots were planted the twentieth of April. In order to have the full advantage of the growth of the leaves, I intended to feed but a few worms at a time, and have successive crops.

On the nineteenth of June, when my trees were about eighteen inches high, my first eggs hatched, the next hatched June twenty-sixth, sooner than I expected or intended. Fearing I might get no more eggs to hatch, I fed about twelve thousand worms on the sixteenth. The trees being small and the season exceedingly dry, the leaves grew very slow. About a week before the worms spun, I took from the worms I was feeding on the leaves produced on the sixteenth of an acre, about five thousand, and borrowed and weighed the leaves to carry these through. To do this, required one hundred and forty-three pounds of leaves. The worms thus fed, together with a few hundred of the two-crop variety, fed late in the season, produced *thirty-eight pounds and eleven ounces* of *cocoons*. After deducting the proper amount for leaves borrowed, which, according to Count Dondola, is twenty-one pounds of leaves for each pound of cocoons—six pounds and thirteen ounces being deducted, I had from the sixteenth of an acre *thirty-one pounds and fourteen ounces of cocoons*. About nine pounds of these cocoons were the mammoth white, the balance were the common sulphur, except about two pounds of the two-crop variety. I was entirely ignorant of the process of feeding when I commenced, and indeed of the necessary fixtures and accommodations for feeding to advantage. I fed them as much as they would eat, kept the hurdles clean, and the room well ventilated. The weather was exceedingly warm during the whole time of feeding; but the worms were remarkably healthy, and all wound in about thirty to thirty-four days.

Now as the matter of profit, if thirty-one pounds fourteen ounces is produced from the sixteenth of an acre, then *five hundred* and ten pounds is produced from the acre.

From the Journal of the American Silk Society.

ESTIMATE OF THE VALUE OF MULBERRY AND SILK CULTURE, STATED BY DR. WM. GIBBONS OF DELAWARE, IN THE SILK CONVENTION.

In the following estimate of the intrinsic value of the morus multicaulis, in the culture of silk, I present nothing, but what any one, with a little knowledge of the subject may arrive at for himself. The circumstances alone through which it was elicited, gave it a peculiar interest. I had heard it repeated from various quarters, and read it in the papers of the day, that the price given for the morus multicaulis was an absurd extravagance, that the traffic in it was a wild and ruinous speculation, a humbug, &c. From this cause I was induced to sit down soberly at my desk, and descending to the root of the matter, calculate what the tree was worth, *for the production of silk alone;* discarding all speculation on the profits of raising the trees for sale. And in doing this, to bring my opponents to ground that could not be disputed, by taking known and established data for this calculation, to wit:

1. That one tree of the morus multicaulis, with its side branches, costing sixty cents, with allowance for failures, will make at least sixteen trees, by cuttings.

2. That one cutting, in good ground and with good culture, will produce, the first summer after planting, from eight to ten ounces of leaves.

3. That 3,000 good cocoons will produce one pound of silk.

4. That 12,000 cuttings will grow, for one year, on an acre.

5. That three-quarters of an ounce of leaves will feed a worm.

With these data, the following results must be manifest.

1. 750 trees, including the roots, plant an acre of 12,000.

2. 12,000 trees from these cuttings, yield 100,000 ounces of leaves.

3. 100,000 ounces of leaves, will feed 130,000 worms.

4. That an allowance of 10,000 in 130,000 for death of worms, and bad cocoons is a sufficient allowance, and

5. That, therefore 130,000 worms, will yield 120,000 good cocoons, yielding when reeled, forty pounds of raw silk, and

Lastly, that forty pounds of raw silk, well reeled, will bring $200.

The expense may be estimated as follows:

Rent,	$10	
Planting and culture of the trees,	30	
Raising the worms,	30	
Reeling the silk,	20	
		90
Profit per acre,		$110

In those states where a bounty is given, it must be added to the above; and where the trees are left out through the winter, the planting, &c. of the trees and cuttings must be subtracted from the amount of cost.

The sum expended for trees at 60 cents, is $450; the net gain, therefore, amounts to twenty per cent. the first year on the capital laid out, and leaves $30 for incidental expenses.

For the second year the cultivator has 192,000 trees and roots, the net profit of which, planted on sixteen acres, will amount to $1760, which will leave him a handsome income, and allow him ten per cent. on the cost of a cocoonery. The profits of the third year, should he plant all his roots and cuttings, will pay him for all his improvements, and leave a large sum of money in his pocket.

Now if these important results, which may be readily obtained, were brought before the American public by being carried out in practice, in different sections of the country, it could not fail, eminently to encourage and extend the silk culture.

From the Journal of the American Silk Society.

ON THE RESOLUTION (WHICH PASSED) RECOMMENDING THE ADOPTION OF THE PIEDMONTESE REEL.

Mr. Smith, of Maryland, remarked that the great object to be attained was uniformity in the quality of American raw silk; and this could only be accomplished by the adoption by our whole country of a standard of reeling. As the subject had been suggested by him in the business committee, he would give his reasons here, why he considered the subject of so much importance; and also, why the Piedmontese reel was the only one on which we can rely for the attainment of the great object.

In the first place, said Mr. S., all principal articles of produce are subject to regulation by certain legal enactments, or by inspection, or both, in all countries. The Piedmontese government required all raw silk to be reeled upon a reel of a particular construction, that the form and quality of the article might be uniform and superior. No sooner was this regulation adopted by the government than an improvement in the value of the article took place; and to this day, Piedmontese raw silk commands a higher price than that of any other country. In our own country, the article of flour is not only reqnired to be inspected before it can be sold, to insure its conformity to certain standards of quality, but even the laws require that the barrel which contains it shall be of a certain number of inches in length of stave, and so many inches in diameter of head and bilge; not only these, but the barrel must contain 196 lbs. of flour. And similar regulations exists in relation to almost every other article, certainly all staple articles. Why and for what reason are these regulations adopted? Need I ask this large assembly this question? Is the answer not most obvious to all men who are acquainted with the commerce of the world? The reason is, that the article shali always be of the highest attainable quality, and that it shall be known as such in the commerce of the world; that it shall establish and maintain a character for itself, which shall give it precedence every where. It is well known that in foreign countries the value of articles is often depreciated by mere character, and the reverse. For instance, in South American ports the price of flour varies more on account of the *brand* than on its intrinsic quality. A vessel load of one particular brand, often sells for two or three dollars a barrel more than that of another brand; when, if the real quality of the two parcels had alone been looked to, perhaps the prices would have been reversed. The reason of this preference was alone to be found in the previously established quality of the preferred brand; and it was a fact to be remembered by this assembly, that however good other brands might be, it required a long time to counteract the prejudice in favour of the object of preference. Much, therefore, depends upon character, and it stands us in hand, as beginners in the great business of producing silk, to establish a character for our raw silk at the start, that shall not only insure it equality of consideration in all the markets of the world, but give it precedence every where. And, (excuse me for repeating what I have so recently asserted, when I had the honour to address you on another subject,) all we want to secure this precedence in the very factories of Italy herself, is this uniformity and excellence in reeling. Yes, sir, adopt this resolution, and let the American people imbibe and practise upon its spirit, and you will kill every silk worm in Europe. The Italians themselves, to say nothing of France and England, will give us twenty to thirty per cent. more for our raw silk than they will for any produced in Europe; because, besides its regular conformity in reeling to their known and accepted standard, its intrinsic quality of fibre is superior to all other silks, owing, as I have before stated, to the peculiar adaptation of our climate to its most perfect production.

In the second place, the reasons why the Piedmontese reel is the only one on which we can rely for the accomplishment of this great object, are these. The Piedmontese reel produces the most perfect article of raw silk of any reel known. For a long period of time the silk-producing countries of Europe, were without any fixed standard of reeling. Almost every filature used reels different from all others. The forms of the article were as various as the number of the reelers. The consequence was, that the manufacturers were obliged to adapt their machinery to every little parcel of raw silk. This caused much trouble and expense to the manufacturers, and they of course were obliged to deduct an equivalent from the price they paid for the raw material. This condition of the silk producing interests at length attracted the attention of the Piedmontese government, which, after long deliberation, appointed a board of scientific men of the highest character, to construct a reel upon such principles as should insure the most perfect article. The result was the reel now known as the Piedmontese reel, and which is universally used in Italy, and which is now recommended to your attention, and for the adoption of the American people. Let me digress again for a moment. I do not pretend that '*Yankee ingenuity*' cannot invent a more ingenious machine, I know them too well for that, nor do I wish to compel all our people to purchase and use this or that man's manufacture or construction—we care not who makes or who sells

the reel used. The great object is to induce all our people to use reels that shall produce a uniformity of results; and as the Piedmontese reel produces raw silk of the most perfect quality, as silk from this reel is known and appreciated all over Europe, and all the machinery of the factories are adapted to its use, we ought to adopt this reel also. As we are *beginning*, it will be far easier for us to adopt the Piedmontese reel, and make our raw silk conform to the standard of form now preferred, than to compel all the factories of Europe and America to alter their machinery for the purpose of adapting it to our silk. The Piedmontese reel is constructed upon principles peculiar to itself. The skein produced by it is always exactly of a certain length, (six feet eleven inches circumference,) the threads are laid upon the bars in a diagonal line, crossing obliquely each layer in such a manner that the fresh wet thread never comes in contact with the wet thread just before laid on, and consequently there is no glueing of the threads together. The skeins thus reeled are also unwound by the manufacturers without any waste, as the peculiar manner of laying it upon the reel enables them to unwind it without any difficulty from *tangling*. Various other valuable objects are obtained by the use of this reel, which it would take too much time to describe in detail.

But, continued Mr. S., even if this reel possessed no single quality superior to the hundreds of other kinds, the single fact that the article produced by it is known and preferred throughout Europe and America, is sufficient of itself to warrant us in universally adopting it.

It seems necessary to explain that the object in recommending the Piedmontese reel, is, that we may produce the best possible commercial article of raw silk. We have no reference to the making of sewing silk, or other domestic articles; nor have we any reference to the use of the various machines that have been invented for making sewing silk, &c. These machines are all, doubtless, admirably adapted to such purposes; and will no doubt be used for them. But it seems necessary to say here that raw silk, as reeled on the Piedmontese reel, is adapted to all the forms of manufacture to which raw silk can be applied; and that after it is thus reeled, it can be doubled and twisted into any form required. It is a matter of doubt with me, therefore, whether any of these machines will be retained in use for any kind of silk after we obtain a thorough acquaintance with the subject.

Before I conclude, permit me, in answer to various questions from different parts of the house, to say, that there is in Philadelphia, a perfectly constructed Piedmontese reel. It was imported in 1826, by Dr. James Mease, of that city, who was then actively engaged in promoting the cause; and I believe that reel is the only true one ever imported. Dr. Mease early foresaw the great advantage of *beginning right* in this business, and permit me to say here, that to him is the country indebted for much valuable information on the subject of the silk-culture.

Permit me, Mr. President, to make one more remark, and I will then leave the subject to the disposal of the convention. I have labored hard and long in the silk cause; I have done much to introduce into our beloved country, this most valuable branch of industry; but I have never done any thing of half the importance to the cause that this resolution will accomplish, if seconded by the American people. I feel, Mr. President, that all that has been done, is a mere drop in the bucket compared to this. I therefore ask the convention to pass this resolution, or at least the spirit of it, for I care not for the form, so that we obtain the substance—and I shall then have done my task, I shall have accomplished the great work that has been, I might say, the main object of my life—or at least of twelve years of it. Were I required to point out, as the last act of my life, the way in which my country and countrymen would be most benefited, I should unhesitatingly point to the general production of silk in a domestic way, in all our farmers' families, and in a uniform manner, as the great source of national and individual prosperity, yet reserved to the American people.

DIARY

OF AN EXPERIMENT IN REARING SILK-WORMS.

[There is no mode of conveying agricultural instruction which is so interesting, and at the same time so impressive, as by presenting an accurate and full detail of all the circumstances of some trial or process, with all the incidents, errors, and mishaps, as well as the correct operations and successful results. In general treatises, or in general directions and didactic instruction, the writer necessarily proceeds upon the supposition that each of his rules, as presented in order, is understood, and properly obeyed, and that all goes right in the procedure founded thereon. He cannot, without digressing intolerably, consider and provide for every exception, and disaster, to be caused either by ignorance, or neglect of the directions, or by unavoidable evils of bad weather, or other accidental and rare disasters. It is an account of those necessary omissions, that general treatises, or merely didactic instructions, are rarely satisfactory in all respects to those who are previously altogether unacquainted with the subject, and who, therefore, need to be informed on every particular, many of which would be so familiar to the more experienced writer, as not to be deemed worth being mentioned.

The following diary, (though more concise than is to be desired, on than would have been presented to readers as little informed on the subject as the people of the United States,) is an excellent illustration of what has just been said. The writer is a very intelligent man, and a zealous, though not long experienced silk-culturist; he having had but the benefit of an apprenticeship, or the conducting of a course of experiments, of eleven years in this business; which he had first introduced in a part of France where it had not

before been practised, and where it was before thought unsuitable, on account of the comparatively severe climate. For the department of Aveyron, though in the southern part of France, is so elevated as to be as cold as the northern departments, in the latitude of Paris. The general procedure of M. Carrier in feeding silk-worms is evidently directed by Dandolo's rules, which are those laid down in the French treatise of which a translation was made for and presented in the last volume of this work, (commencing at p. 468, vol. vi.;) and reference to the directions there given will serve to fill out, and make clear, every thing which may not be stated here with sufficient fullness and particularity in the diary. In reading the statements of daily operations and condition of his laboratory, we become, as it were, the companions of the writer in his labors, anxieties, and pleasures, and feel interest in, and derive lasting as well as useful admonition from, every occurrence. We enter fully in all the writer's cares and feelings, sympathize with him in his disappointments, and rejoice with him in his success. Such a diary has all the interest of a narrative of novel facts, as well as offering the most effective of instructions. We hope that the plan of communication here presented, will be adopted this summer by some of the many rearers of silk-worms in this country; and that their diaries, made much more full and minute than this, will be given to the public, through the Farmers' Register.

The following is one of several letters written by M. Carrier to Bonafous of Turin, one of the most distinguished investigators and scientific cultivators of this branch of industry, after Count Dandolo. Each of these letters embraces either the statement of the distinct operations of a particular season, or some other separate and substantive subject, which may appear alone, without suffering for the omission of the others. This is the fourth letter; the fifth will be given afterwards; and the sixth (which was obtained first) was translated for and published in the Farmers' Register, (vol. ii. p. 537) and was thence copied into several of the agricultural papers of this country. It presented estimates of the profits of each of the three departments of silk-culture, (viz. cultivating and providing the leaves, feeding worms, and winding the silk,) which would be more interesting and valuable to readers at this time, than when the translation was prepared and first published. To be interested and instructed by an article on any subject, it is necessary that the readers' curiosity and desire to learn, should have been excited; and for want of previous excitement, or sufficient interest felt in advance, it is probable that various articles which we gathered from French journals, and published in the Farmers' Register several years ago, were not then duly appreciated by readers, who would now study them with interest. Under this impression, we shall resort to the same sources, (from which the American public has been excluded, except so far as this journal has served as the channel of supply,) for some other articles which were then passed over, but are well deserving notice now.

There is a mistaken impression upon most well-informed persons in this county, which causes them to under-rate the value of the writings of French silk-culturists. This is, that silk-culture having been very long prosecuted in France, the articles published thereon, in periodicals of the present time, would be only suited for the information of people who are supposed to be already well versed in the regular business; and that they would contain almost nothing for the instruction of novices, and for a country in which the culture was untried. If the premises were true, this conclusion would be undoubtedly correct; for the best instructions on any subjects, furnished by agricultural periodicals, will always be presented by writers who are in very similar circumstances, and not very much advanced as to time and proficiency, before those seeking to be informed. Between those who are the most and the least advanced in knowledge, there is a want of feelings and ideas in common; and when the best informed instructor is addressing well-informed readers, his lessons will be worth not much to the most ignorant. But though silk-culture in France dates from the time of Louis XI, it has been confined to the most favorable portion, and to a very small proportion of the territory, and carried on even there in a very rude manner. It is but recently that exertions have been made to extend the business, and in its highly improved state, to the central, and even to the northern parts of the kingdom; and the facts and reasoning necessary to forward that object, and all the lights thrown on the subject, are therefore precisely suited to those persons who have had little or no experience. Hence, the recent writings of French culturists are of especial value to the many new or intended beginners in this country.—Ed. Far. Reg.]

FOURTH LETTER FROM M. AMANS CARRIER TO M. BONAFOUS, DIRECTOR OF THE ROYAL GARDEN OF TURIN.

Translated from the French, for the Farmers' Register.

Rodez, June 30, 1833.

I resume, sir, with the most lively satisfaction, a correspondence which has been interrupted by political events, during the last three years. Do not believe, however, that this stormy time has slackened my zeal, or suspended my labors in

planting mulberry trees, and continuing my annual rearings of silk-worms. In truth, in 1832, fearing the invasion of the cholera, I limited my operations merely to raising as many silk-worms as were necessary to preserve the stock of the two precious varieties which you had sent me from Turin. But the crops of 1830 and 1831, increasing in quality each year, have given fine products, and furnished occasions for making new observations, which have entirely confirmed my hopes. All the intelligent persons of our department (Aveyron,) are now persuaded, by twelve public rearings of silk-worms, made at Rodez during twelve successive years, and which have given, on the average, 103 lbs. of cocoons for each ounce of eggs, that no doubt remains as to the possibility of introducing, generally, in our country, that branch of agricultural industry, which offers the most certain advantages to all those who can, and know how to avail of them. I will state, besides, as additional proof, and which I think will be conclusive, the result of my operations of this year.

Not having forgotten, sir, that I owe the greater part of my success to your kindness, and especially to the excellect instruction which you have frequently addressed to me directly, I am the more desirous to continue to inform you of my trials, and the progress annually made therein.

To render my statement more exact, I shall lay before you an analysis of the journal of my rearings, in which I have been in the habit of carefully noting the operations of each day, as well as all the facts which appeared to me worthy of being examined.

Rearing of silk-worms made in 1833, *from* 22½ *decagrammes of eggs,* (7½ *ounces.)*

May 7th. The eggs detached from the cloths, and collected in the vessels for washing and cleansing them.*

11th. The eggs put upon hurdles of wood, and placed in a small apartment, for the purpose of hastening the hatching by artificial heat, which was at first raised to 75 degrees, then to 77, and at last to 82.†

18th. The worms hatched in great numbers; this had been announced by some few of them hatching the day before. The same day (18th,) the first lifting and removal of worms were made, by the ordinary procedure, amounting to about half the whole product.

19th. Nearly as many more hatched.

20th. A few more obtained. The balance of the eggs appearing unproductive, were thrown away.

At the hatching, the worms were distributed into three divisions, so as to make them come to maturity at one or two days difference of time between the several portions. This plan has always been found convenient, because it facilitates the labors of the last days, by dividing them, and thus requiring fewer laborers and less haste, and permitting more economy. This plan is very easy to put in practice, as the silk-worms accommodate themselves wonderfully to their treatment. Their growth is forwarded or retarded at pleasure, by employing more or less heat, and more or less food, without danger of injuring their health in the least. In resorting to this plan, however, it must not be neglected to keep the worms of each of the different divisions perfectly equal in their condition, in order that the several moultings of each may be made regularly and at one time.

No notice will here be taken of any but the first division. The same cares were given to the two others, and the like results were produced.

First Age.—May 18th. The first day of the rearing, the silk-worms were lifted at 10 o'clock in the morning, by means of young shoots of wild (or seedling) mulberry. In this day they also received two repasts of leaves chopped very small.

19th, 20th, and 21st. They had four repasts, each day.

22d. They seemed disposed to make their first moulting. Still a repast of more or less leaves, was given.

23d. They are almost all in their dormant state. To hasten to that state the more backward ones, a few more leaves were given to them at many times during the day.

24th. No food given. In the morning, some worms already awakened, and the others still torpid. At 4 o'clock in the evening they had revived in great numbers. To-morrow all will be awake.

This first age, which has lasted 7 days, has been very fortunate. Not a single worm has been lost. The temperature of the small laboratory has been kept constantly, by means of fire, at from 66 to 68 degrees.

Second Age.—May 25th. At 4 o'clock in the evening, the worms after having completed their first moulting were lifted by twigs of mulberry of somewhat larger size, and changed to a larger apartment. At 10 o'clock at night, they had another repast.

26th, 27th, and 28th. They devoured, with avidity, five meals each day. Their health is perfect. Five meals were given for the purpose of advancing this first division two days before the second.

29th. Again five meals, but less copious. The decrease of appetite indicates the approach of the second moulting.

30th. The worms eat very little, and by evening are all torpid.

31st. They revive, with facility.

The second period has also been passed through most fortunately, and again was of 7 days' duration. The litter has not been changed through this age, because it was not thick, and never moist. The leaves, besides, have been given with discretion, and were always entirely devoured. As yet there are no worms dead, not even of the sick and the backward. The insects have continued so lively and animated, as to cause good hopes of the results. The temperature has continued, without fire, at from 71 to 75 degrees.

When it was determined to hatch more than 7

* The various operations which are here slightly alluded to, are fully described in the treatise on rearing and feeding silk-worms, translated from the French, in the 6th vol. of the Farmers' Register, from page 468 to 480.—Ed. F. R.

† The degrees of temperature in the original are marked according to Reaumur; in this translation, they are changed to the equivalents of Fahrenheit's thermometer.—Ed. F. R.

ounces of eggs, the design was to reduce them afterwards to the product of 5 ounces, by getting rid, at each moulting, of the worms in bad condition and of doubtful health. It was believed that there would be leaves for no more. To-day, after an examination of resources, and of the fine appearance of the mulberry trees, it was decided to throw away none of the worms.

THIRD AGE.—June 1st. The worms commenced their third age, and were changed to the large laboratory in two hours of time. In this new locality, at noon, the temperature was 73 degrees without fire. This first day, three repasts only were given.

2d. The weather is very fine, and the interior heat was 75 degrees at half after 7 o'clock in the morning. At 4 in the evening a storm occurred which has very much lowered the temperature.

3rd. At 5 o'clock in the morning, the thermometer indicated only 59 degrees. The worms then have experienced, within 24 hours a diminution of 16 degrees. It was observed that they seemed a little benumbed, and that they ate the leaves but slowly. Many fires have been lighted, and notwithstanding, at 5 o'clock in the evening, the thermometer has lowered still 2½ degrees more. Raining all the day. The leaves had been gathered wet, but they had not been given until after being dried upon the floor of a high stage, in a brisk current of air. Notwithstanding all these evils, the worms appeared lively enough at the last meal, at 9 o'clock at night.

4th. At 5, A. M., the outer air was cold, and the thermometer indicated 55 degrees in the laboratory. The fires have been quickened, and the temperature was raised, in two hours, to 62 degrees. The evening was milder. The worms are well, and eat wonderfully.

5th and 6th. The weather fine, and the thermometer at 66 to 68 degrees during the 24 hours. The worms doing as well as is possible.

7th. Rain all the day. The leaves gathered wet, but dried around a fire. The moulting, which ought to have taken place yesterday, is retarded by the humidity of the weather. The worms are becoming torpid but slowly; yet they have had all the day from 66 to 68 degrees of heat, by aid of continual fires.

8th. The weather fine enough, although the sky has been obscured part of the day. Almost no fire, and yet the temperature all day has been from 66 to 68 degrees. The worms seem to be all in their dormant state; still, every two hours a little cut leaves given. It was observed at the time of this moulting, as in the preceding years, that there were a few worms which did not become torpid, and which wandered over the leaves, without eating. Three hundred of these worms have been put, for experiment, upon a little shelf to themselves. Perhaps some curious observations may possibly be made on them.

9th. The weather very fine, and the worms in the best state of health. At 5, P. M. they are almost all awakened. The temperature, without fire, has been constantly from 68 to 71 degrees.

The third age then has lasted nine days, and has been sufficiently remarkable for the inconstancy of the weather, and still more for the variations of temperature of the laboratory. The moulting, however, has been very good, and the worms do not appear to have sustained any other damage than being one or two days retarded in their progress to maturity.

FOURTH AGE.—June 10th. At 10, A. M., the worms have commenced their fourth age. They have had two meals, without counting in the leaves of the twigs by which they were lifted from the litter. The weather superb. The thermometer has risen in the day to 77 degrees, and has not been under 68, without fires. Never was there a better promise of success.

11th. Wind from the south, very strong. Still 68 to 71 degrees of heat. The worms increase in size visibly, and still go on well.

12th. The thermometer had sunk in the night to 62 degrees. The wind is very cold. The fire in the chimney has been lighted. To-day too many leaves have been given; the worms have not eaten all. Orders are given to clean it away, and to supply food less abundantly.

13th. The worms eat heartily, and are growing fast. The temperature 64 degrees with fire, in the morning; and from noon, 66 to 68 degrees without fire.

14th. Rainy weather all the day. The leaves have been gathered part wet and part dry. There was need of fire to keep the temperature up to 64 degrees.

15th. In the morning 62 degrees, and at noon 66. Weather gloomy. The state of the worms shows that they are about to make their last moulting.

16th. Almost all the worms assumed their dormant state in the course of this day. The warm and clear weather favors their sleep. At 11 at night, a violent storm arose, with loud thunder.

17th. The worms revive, all together. The sky is clear, the air hot and heavy in the laboratory. Notwithstanding the opening of the windows, and of a large ventilator, (*soupirail,*) the heat could not be reduced below 75 degrees. Up to this time there has been no unpleasant scent; persons unaccustomed to the air of a laboratory, have not been able to discover any other odor than that spread by the green leaves of the mulberry.

The fourth age has been finished, and perfectly, in 8 days. The worms entered and revived from their last moulting very equally. At this moulting, there were fewer wandering worms, by half, and these were taken out and thrown away immediately. To this time, the rearing of this year presents much less of loss than in any of the preceding years. The season has been very favorable.

FIFTH AND LAST AGE.—June 18th. All the operations of changing the worms to fresh hurdles have been completed with rapidity, in a fine day and with a natural temperature of 73 degrees. They have seized on the young branches of mulberry with the greatest eagerness.

19th. In the morning, the temperature was at 66 degrees, at noon 71, and at 3 P. M., 75 degrees. The worms have had to-day four meals and have eaten 8 quintals* of leaves.

20th. Cloudy; 71 degrees. The appetite of the worms augments, and the consumption (of all of the three divisions) has risen to 10 quintals. The rearing goes on well.

21st. Weather cold and gloomy. Temperature 62 degrees. The fires have been lighted, and have increased the warmth to 66 degrees.

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* The Paris quintal is 100 lbs.

The worms have had, at four meals, nearly 15 quintals of leaves. No worms dead, nor dying.

22d. The sky is still obscured, and the weather continues cold. At 5 A. M. the thermometer indicated only 62 degrees, notwithstanding the increased fires. None of the worms which have made the fourth moulting have been found dead; and there are some dead of the small number which did not then fall into the fourth sleep. All of this kind are thrown away, without mercy. The consumption of leaves becomes enormous; it has been, this day, about 20 quintals. The worms are in good appetite.

23d. The worms are in the most ravenous state, and could not be doing better. The sun reappears, and the temperature rises, without fire, to 71 degrees. The consumption of leaves is frightful. The trees are stripped, and the fear of the leaves failing causes me much uneasiness. The expenditure to-day is 23 quintals. The windows remained open through the day. Still no bad odor. We have not cleaned the hurdles since the last moulting, but it will be done to-morrow, not so much for the purpose of removing the litter, which is but of little thickness, and not heated, but to give the worms more space, as they lie very thick.

24th. After the morning meal, the worms were removed, and the litter cleared away. There were found on the hurdles very few dead worms. The strongest appetite (*freze,*) continues still, but less violently, especially in the evening. However, 18 quintals of leaves have been devoured. The number of mulberry trees yet to be stripped is greatly diminished, and the fear of a want of leaves increases every hour.

The day has been very fine, and the interior temperature has been kept to 71 and 73 degrees, the windows being open from 10 in the morning to 5 o'clock in the evening.

25th. This, the eighth day of the fifth age, has been very fine. The temperature still 71 to 73 degrees. The appetite of the worms slackens progressively, and the fear of there being want of food is much lessened. There still remain 37 large trees to strip. The consumption 13 quintals. It is already observed, with pleasure, that the worms are disposed to spin. They exhibit all the signs of their maturity being near. They will doubtless climb in two days. We must to-morrow fix the faggots of broom, (or hedge for them to spin in.)

26th. The brightness and heat of the day yesterday have much hastened the maturity of the worms. These circumstances will advance, by a day, the term of their career. There were found many of them this morning which had already quitted their litter, and had climbed even to the ceiling. After the meal at 10 A. M. there is a general movement on all the hurdles; the worms run here and there, searching for support. There can be no mistake; they are ready to mount, and this is especially the moment of delight to the amateur culturist. Four persons are engaged immediately in placing the branches of broom upon the highest shelf, in order that they may receive the most forward worms from all the hurdles below. This operation will not cease until all the shelves are thus prepared. As fast as the broom is placed, the worms climb to it with a degree of haste which I have never before remarked. This labor is finished at 5 in the evening, and nearly half of the worms are already mounted. The weather changed towards noon. The sky was covered with clouds, and at 6 o'clock a storm occurred, accompanied by loud claps of thunder, which operated to slacken the climbing of the worms, but caused not the slightest derangement to the labors of those already on the broom. The consumption of leaves still diminished; and no fear remains of any scarcity.

It should be observed that the quantities of leaves used, and which have been stated for the latter days, were consumed by the whole mass of worms of all the three divisions. With all the desire to do so, it was impossible to estimate separately the quantity eaten by each division; and the statement made, of their joint consumption, is only to establish a fact which should warn all persons, beforehand, of the enormous provision of leaves which must be made for the last age.

27th. On this, the forty-first day, and the last, of the rearing, the worms of the first division are all lodged in the cabins made by the placing of the broom, and they are actively engaged in spinning their cocoons. The other two divisions are following near, to the like successful end.

I leave for a time, sir, my wonderful spinners to their labors, and in a continuation of my letter, which will not be long in coming, I shall present to you the product of this rearing, and the observations which it has caused me to make; and I will speak to you of the progress of the planting of mulberries in our country, leaving the evidence of results to show the advantages which the people of Aveyron can draw from this culture.

AMANS CARRIER.

ESTIMATES

OF THE EXPENSE AND PROFIT OF AN ACTUAL REARING OF SILK-WORMS.

[The following article is not less interesting than the preceding, of which it is a continuation, and for similar reasons. It presents a statement, in detail, of the expense and profits of an actual rearing of a brood of silk-worms—and not merely, like such as has been so often published in this country, an estimate of what the writer either supposes in advance of facts, or wishes his readers to believe, *would be* the cost and profit of operations yet to be performed, and of which the value is yet to be tested. Such a mode of estimate may show any desired result, and therefore they may be had of any desired amount in American publications, and offering from $100 to $1000 of returns from the mulberry leaves of an acre, to be fed to silk-worms. The estimate of M. Carrier may also be very incorrect in the general result shown. But even if so, he has exhibited the facts and stated the prices which furnish his premises; and if the valuations are wrong, the error may be corrected, or made such as the reader may admit as certain, and the product be then calculated according to the change of the grounds of calculation. And though we

confide fully in the correctness of M. Carrier's estimates for the country in which his labors were performed, they are necessarily unsuited in several respects to the circumstances of the United States, in general, or Virginia in particular. This detracts nothing from the value of his practice and opinions; but will require to be made by the American reader some allowances in the data, which of course will affect the result. Thus, the prices stated for labor are much too low for this country. Those for white mulberry plants are very low, in money-price, compared to those now given here for the multicaulis mulberry. On the other hand, the loss of the use of the white mulberry, for the first five years of its growth, costs more than thrice the purchase-money; and the rent of land in France is tenfold more costly than that of equal quality in Virginia. But all these differences of circumstances, though they should be duly considered and allowed for, are not in the least objectionable. It is sufficient for our purposes, and profits, if a certain amount of labor, of land, of food, &c., can produce a certain amount of silk at Rodez; for our climate is better for silk-culture, and therefore, the employment of the same means will produce equal, if not still more valuable results.—Ed. F. R.]

FIFTH LETTER FROM M. AMANS CARRIER, TO M. BONAFOUS.

Translated for the Farmers' Register.

Rodez, July 5th, 1833.

I have presented to you, in my letter of the 30th of last month, the principal circumstances of my rearing of silk-worms of this year. I propose now to show you what profits I should already have realized therefrom, if I had been willing to forego that to be derived from the winding of my cocoons.

By July 2d, the worms of all the three divisions [as stated in the preceding letter,] were fixed on the hedge. The backward worms were but very few; and, with some care, cocoons were obtained from almost the whole of the worms.

On the 8th, four persons were employed in gathering the cocoons from the broom which had received the worms of the advanced division. This labor occupied the whole day.

On the 10th and 12th, respectively, the same persons performed the like operation for the two later divisions. There were found on the broom a very few dead worms, of the kind called *capelans* in the south, because of their black color. I shall give hereafter the reason of this rare fact.

On each day of gathering, the cocoons were weighed with minute precision. The weights were as follows:

July 8th, 1st division,	356 lbs.
10th, 2d do	292
12th, 3d do	280
Total,	928 lbs.

The cocoons collected were placed upon the same hurdles which had served for the feeding, (but after having been cleaned and again covered with paper.) They occupied six shelves of 27 feet long, and 4 broad. The thickness of the cocoons was about three inches. It is, as I was told, the best mode of preserving them, by preventing their being heated, which happens when they are heaped. These cocoons have been examined, with the greatest attention, by experienced connoisseurs. It results from this verification, that they are of very equal sizes, almost all depressed around the centre, and well furnished with silk to the extremities, a circumstance very favorable to a good winding; in pressing them between the fingers, there was some difficulty to indent them. Their color is of the whiteness of snow, and their texture extremely fine. Taken at hazard, and on many parts of the hurdles, it was found that it took 203 cocoons to weigh a pound.*

I will observe to you, sir, and I shall do it with pride, that we have already arrived at equalling in products the model-rearings of Count Dandolo. We have obtained 123½ pounds of cocoons from the ounce of eggs; and, according to the tables which accompanied his excellent work, his crop, in each of these years, barely reached 121 pounds from the ounce of eggs.

I do not pretend to believe that we shall be always equally favored; for I think, and ought therefore to say, that many fortunate circumstances concurred at this time, to cause such success. These were, the fine weather, and the abundance and excellence of the leaves for the one part, and for the other, the favorable position of the new laboratory, the increase of currents of air, a better arrangement of the hurdles, and perhaps, also, the management better understood than formerly.

Elsewhere, however, still better products have been obtained; and it is gratifying to me to inform you of a rearing made in this department, of which the result proves that we are very favorably situated to profit by silk-culture. Madame Loirette, of Millau, has raised this spring the silk-worms proceeding from 5 ounces of eggs; and has obtained 700 pounds of cocoons, or 140 pounds to the ounce. This lady, whose intelligence and zeal are already properly appreciated, has a claim to the gratitude of the country, for the good example she has offered, in making, every year, very careful and well conducted rearings of silk-worms.

I now reach the essential part of my letter, to that which will fix, I doubt not, the attention of my countrymen.

After being satisfied that mulberry trees can prosper in our country, and that the climate is favorable to raising silk-worms, the capital object of the proprietor is to know what expense will be requisite for him to incur, in undertaking this culture, and what are the profits which he may expect to obtain. To fix this properly, it is only necessary to make an estimate. Mine will be here presented.

In 1829, the seventh year of my planting, I showed, (in a note addressed to you, Sept. 15th,) that the clear profit of my rearing silk-worms at that time, had been 33½ per cent. upon the capital employed for the purchase and planting of the mulberry trees, the use of manure, rent and tillage of the land. Now I shall make the account

* This great weight, as well as the length of all the ages of the worms, prove that they were of a larger kind than the common; and, as we believe, less profitable.—Ed. F. R.

for the eleventh year since beginning the plantations.

The piece of land where my mulberry trees are planted, is at the gates of Rodez, and devoted, these thirteen years, to the culture, as a nursery, of all kinds of trees, for fruit and ornament, to the number of more than 80,000. The size is about three hectares. The part occupied by the mulberry trees cannot be estimated at more than one-sixth of the whole surface.* For the sake of proper order and arrangement in the plantations, and to regulate things so that the mulberry trees intended to produce leaves for feeding shall not in any manner injure the trees of the nursery,† I have enclosed this property by a road of three metres [10 feet.] in width, planted on both sides, with a row of dwarf mulberries, standing at three feet distance from each other. This road forms straight lines from one corner to another. All the irregular parts lying outside of this great quadrangle [formed by the road,] are also set in mulberry trees. I have also planted upon a point exposed to the south, 125 standard mulberry trees,‡ which are in five lines, and fifteen feet apart. Some other trees, which also are standards, separate the several compartments of the interior of the nursery.

Estimate. Expenses of every kind.

	francs. c.	francs. cen.
225 standard mulberry trees at	1	225
Planting and manuring the 225 trees at	0 75	168 75
450 dwarf-trees on the borders, or separate,	30	135
135 dwarf-trees disposed in a hedge,	30	40 50
Planting and manuring the 585 dwarfs at	60	333
2,500 plants in seed-bed, the 1000 at	20	50
Their planting, without manure,		100
Culture, 40 days' work a year, and for 11 years, 440, at	1 50	660
Rent of a half-hectare of ground for 11 years, by the year,	100	1,100
Total expenses,		2,812 25

Not an inconsiderable part of the plantations which are embraced in this estimate, are of trees of three, four, and five years old; and one-third of the trees, at least, have not been stripped this year, particularly a young coppice of 1500 dwarf-mulberry trees, grafted not long since. I think, after these considerations, that it is just, for fixing the exact income of 1833, to deduct from the above expense, that of the culture and rent of ground occupied by the trees of which the leaves have contributed nothing to the production of the cocoons. In this case, the sum total of 2,812 $\frac{25}{100}$ francs, will be reduced to less than 2000. However, it is this last sum which I have taken as the basis of my operation. If I do not count, in the general addition of expenses, the interest of the sums advanced each year, nor the rent of the locality for the feeding, it is because I have been largely indemnified by the result of the preceding rearings, and by the crops of vegetables of every kind, cultivated between the rows of mulberry trees.

Let us now see the product of the rearing, and compare the revenue of this year with the expenses already incurred.

The 928 lbs. of cocoons, might have been sold, for cash, according to usage, at 1 franc 50 centimes - - - -		1,392.00
Deduct the expenses of rearing, viz.:		
62 days' work of a man, at	1.50,	93.00
33 do. of a woman, at	75	24.75
16 do. of a child, at	50	8.
4 sacks of charcoal	1.50	6
Pit-coal - - -		8
Lights - - -		2
Loss of broom to form the cabins, and of which the rubbish served to feed the fires - -		20
Paper and other small charges - -		10
Total expenses		171.75
Net product		fr. 1220.25*

This sum of 1,220 $\frac{25}{100}$ francs, obtained, in the eleventh year of my planting, from the employment of a capital of 2000 francs, is equal to an interest of 60 per cent. And even if the whole expense of 2820 $\frac{25}{100}$ francs be counted as the capital, the interest will still be above 40 per cent.

It should be observed moreover that this plantation gives product in the five years less considerable, in truth, [than will be the average product,] but which will progressively increase with the growth of the trees, without the expenses being increased in the same proportion.

Such results, (obtained at Rodez, a point of the department where the climate is severe enough, and the temperature very variable,) appear to me, as I have said before, of a kind to command the attention of all the proprietors of land proper for this culture. Indeed, I ask of you, sir, what other branch of agricultural industry offers to the cultivators such great profits?

I will add some of the observations which I have been able to make upon my three last rearings of silk-worms.

I. At each period of the life of the worms, there are to be observed some that are not disposed to moult. These are of two kinds; the first are swollen, larger than the ordinary worms; their color is livid and shining; they are almost always extended upon the litter, without making the least movement; however, when food is given, they climb upon it, and eat a little. The others, to the contrary, are meager, thin, and wrinkled in the forward part of the body; they remain attached to the point of the hurdle which they occupy, keeping their heads raised, and moving them continually. Their muzzle is very pointed. These

* The hectare is not quite 2½ English or American acres; therefore the whole piece of land was about 7½ acres, and the part in mulberry trees, 1¼ acres.—Ed. F. R.

† It should be borne in mind, that it is of the white mulberry that M. Carrier speaks; the leaves of which are not plucked for feeding, nor cannot be, with safety to the trees, until after the trees are five years old.—Ed. F. R.

‡ *A haute tige*, that is, intended to grow to full or natural size, instead of being confined and dwarfed by close planting, or other means.—Ed. F. R.

* Or $227.65, the franc being 93 $\frac{3}{10}$ cents.—Ed.

two kinds of worms seem to be suffering under some disease which obstructs their moulting. There perish a number at each time for moulting. Three hundred of these, were separated this year, at the third moulting, and placed apart for observation. It resulted from this trial, that more than half of them could not moult, and were dead in a few days. The large and shining ones died of the *gras*, or *yellows;* and the others became contracted and shortened in a remarkable manner. Their bulk diminished more than half, and they were soon in a state of putrefaction. Among these sick worms which got through the difficulties of this moulting, many sunk under the fourth; and none made any other than bad cocoons. From this fact, which, in my opinion, is at present incontestable, I conclude confidently, that it is best to hatch at least one-fourth more worms than you intend to rear. By this means, you can rid yourself, at the different moultings, of all the backward worms which consume uselessly much of the leaves and cause infinite trouble in attempting to equalize them with those more advanced. For several years, I have been using this method with success. To put it in practice, it only requires at each moulting a day's labor of an experienced hand, who picks them out and throws them away. This little expense is well paid for.

II. It is best to keep an empty hurdle ready for the moment at which the worms are ready to begin to spin their cocoons. This practice has two great advantages. At first, that of allowing the faggots of broom to be fixed at the first sign of the climbing of the worms, and of its being done with care, without the fear of seeing the worms crushed under the unskilful hands of the operators; and of cleaning them more conveniently and thoroughly than when they are upon the shelf on which are formed the cabins: then, these boughs, which ought always to be put on the upper hurdle, are destined to receive the worms from the lower shelves, which anticipate by some hours, or even a whole day, the general climbing. This process also permits you, before placing the broom on the edges of all the hurdles, to wait until the greater portion show a disposition to climb. When this moment comes, they are taken from the shelf next below, and are placed on the highest which has been prepared for this purpose. This hurdle is cleansed, the broom is put on it, and the worms from the next one below are removed to it, and so on, whatever may be the number. In this manner, the lowest hurdle remains vacant, and ought to be furnished with boughs to receive from the upper hurdles the backward worms which do not climb for 24 or 36 hours at the latest. By this process, the worms are not put under the cabins until they are ready to spin; the hedge is then covered with worms in a little time, and as soon as it is perceived that those which remain cannot find a place there, you must hasten to remove them, to prevent their suffering from the filth of those which first climbed up. It is to this method of proceeding, sir, that I attribute the great advantage I have had, this year, of finding very few worms called *capelans*. This fact is easily explained, by the worms which climbed first being healthy and vigorous, while among the backward are found a certain number which have scarcely strength to climb the hedge, where they perish without ability to begin their work.

III. In the twelve rearings I have made, I have not found a single worm dead of *muscardin*. Our climate seems fitted to remove from us the danger of this terrible scourge, which, in warmer climates not unfrequently destroys whole laboratories. I ought to tell you, however, that having been in the habit, for two or three years, of opening all the cocoons intended for propagation, whenever the butterfly failed to come out, I have found from ten to twelve which enclosed a worm in the state of disease called *muscardin*, or *dragée*.

IV. Wishing to examine, myself, if it was possible to retard sufficiently the hatching of the eggs, so as also to retard the rearing, in years when foliage is backward, I made this year the following experiment: On the same day that the eggs were put in the chamber heated to the temperature of 19 degrees, I had a small number placed on a marble table, without any thing intervening but a thin sheet of paper. This table was in a room the doors and windows of which remained open a large part of the day, the temperature varying from 7 to 18 degrees. The eggs so placed, have fully answered the object, and the worms were hatched four days after those which had been warmed artificially. They have been reared seperately, without much care, and have succeeded well. This experiment seems to me to prove two things: first, as I have already often said, that worms hatched spontaneously yield good products; and secondly, that there are very few means to impede, for any length of time, the hatching when the proper season arrives, unless by a procedure extraordinary, and always uncertain; for example, by means of ice-houses. Is it not to be feared that infecundity of the eggs will be produced by exposure in such a place for a long time? It is not the cold exactly, that I would mostly fear, because in the winter of 1829 and 1830, the greater portion of my eggs for propagation were placed in a chamber, where the thermometer descended more than once to 16 degrees below freezing; and another small quantity which was left attached to the borders of the shelves, where the moths had laid them, was exposed to a degree of cold as much as 2 degrees below 0, during the most rigorous days of that memorable winter; and, would you believe it sir! all these eggs hatched well and produced fine looking worms.

I shall have still farther observations to present to you, but think it time to end my present letter. In my next, I will tell you of our perplexities in winding, and our efforts to overcome them. I will also keep you informed of the progress of our mulberry plantations, and you will be convinced, sir, by my communications, that if we have had to struggle for a long time against vexatious prejudices, they are on the eve of disappearing from our department. Private interests, besides, will be the most able advocate for the adoption of a culture which produces so much for my country.

AMANS CARRIER.

For the purpose of making the statement complete, for the benefit of readers who have not the 2nd volume of the Farmers' Register, an extract will be taken from M. Carrier's sixth letter, which was therein given at length.

1. "The proprietor who wishes to occupy a plantation of mulberry trees, supposing he had already at his disposal a quantity equal to those which I stripped last spring and in the same condition, (that is) producing 160 quintals of leaves at 4 fr. the quintal—well! this proprietor could have obtained from half a hectare of ground with no other expense than that of cultivating the trees, a revenue of 640 fr. or 320 fr. for each *seteree*. composed of 640 square fathoms.

2. The person who would have bought this quantity of leaves to devote himself only to the raising of silk-worms, would have had (as I did) 928 pounds of cocoons, and would have sold them at 1 fr. 50 c. a pound, according to the price of that time: this sale would have produced, - - - - - 1,392fr. 00c.

Deduction of expenses, purchase of about 8 ounces of eggs at 3 fr. - - -	24fr. 00c.	
Expense of all kind for the management, - -	171 75	895 75
Price of 160 quintals of leaves at 4 fr. - - -	640 00	
Rent of the room, -	60 00	

His part of the profits for 40 days attendance, - - - - 496 25

3. The *filateur* (or reeler) who buys the cocoons, obtains a quantity of silk equal to mine, and sells it in the same manner, - - 1,868fr. 55c.
He draws from the remains, - 115 00

Total, - - - - - 1,983 55

It is necessary to deduct from this sum as the cost of 928 pounds of cocoons at 1 fr. 50 c.	1,392fr. 00c.	1,655 85
Expenses of the filature,	263 85	

Clear gain of the reeler, - - 327 70

4. The laborer, with a family, takes for his share the remains of this filature, employs his wife and children to prepare and wind the low and different qualities of silk, which are in much request and readily sold. These products can be valued, after having received all the suitable work, 165fr. 00c.

Deduction for the purchase of the first materials, -	50fr. 00c.	80 00
Hand work, although gained by the family, - - -	30 00.	

Profit, without including his work already paid, - - - - 85 00

A simple recapitulation will make the result better understood than this division of the labor, which division certainly agrees, in many cases, with the taste or situation of persons who neither wish, nor are able, to undertake all parts of the business.

The land owner who sells 160 quintals of leaves at 4 fr. receives, 640fr. 00c.
The person who buys them and manages the raising of worms, gains, 496 25
The reeler who takes charge of the cocoons, winds them, and receives for his labor, - - - - 327 70
The laborer who works up the remains does the labor for 30 fr. and gains besides, - - - - - 85 00

Sum equal to the total profit which I have made by the union of all these operations, - - - - - 1,548 95

Equal to $288

The position of Rodez, in the south of France, (though farther north than silk has heretofore been generally or usually cultivated,) may induce the opinion that the climate agrees with its latitude, and that the culturist in Virginia would be less advantageously situated. We have no doubt but that our climate is better for silk than that of any part of France, and very far superior to that of Rodez. For more full evidence of the unfriendliness of the latter, we will add an extract translated from another French writter, M. Huzard, who cites this statement of M. Carrier's, and maintains that the position of Rodez is as cold as that of even the *northern* parts of France, the fitness of which for silk-culture he was adducing facts and arguments to maintain. His words are these:

"I will cite, on this head, a new culturist, under a climate which, comparatively, and because of the great elevation of the land above the level of the sea, is much more rude than the climates of the north, [of France,] and which consequently ought to be more disadvantageous to silk-worms and to mulberry trees."

The writer then copies the statement of profits given just above, and adds, "I ask if this is not a great product, and well worth the trouble of attempting to obtain the like. I do not think that any one will object that M. Amans Carrier is in the south of France, and in a climate more favorable than the central and northern parts. The climate of Rodez is a rude climate, and one much more disadvantageous, certainly, than that of Paris."

From the New England Farmer.

PROPAGATING PEAR TREES FROM ROOTS.

Extract of a letter from VAN MONS.

I now propagate for myself and intimate friends, the most choice varieties [of pears,] which I obtain by *means of the roots*. Not a single one fails, in this new process. It is immaterial in what manner they are set out. This method was discovered accidently, in consequence of some roots, on which I intended to graft other kinds of pears, being thrown on the ground and covered with a little earth, to preserve them until used for that purpose, and which were lost sight of and forgotten until the next spring, when all of them sent up stocks, which, in the autumn, were as tall as those raised from the seed, of two year's growth. They can be set out in the spring as well as autumn. If I had sooner known this method, I should not have lost a single one of my new

varieties of pears,—for roots could have been taken from all the kinds, in my large plantation, at the time of its destruction.

Such roots should be selected as have one or more terminal fibres, and those that are often cut off, or left in the earth, when a tree is transplanted, succeed well. They cannot be too small, but should not be larger than the finger. The wounds at the large ends of the roots should be covered with some composition, to protect them, as in grafting. They must be set out obliquely.

MEMORIAL OF THE INTERNAL IMPROVEMENT CONVENTION TO THE GENERAL ASSEMBLY OF NORTH CAROLINA.

To the Honorable,
The General Assembly of N. Carolina.

The undersigned have been deputed a committee to present to your honorable body a memorial, expressive of the views and wishes of a large and respectable portion of your fellow-citizens, recently assembled in the city of Raleigh, in convention, upon the important subject of improving the internal condition of the state. In the discharge of this duty, we feel well assured of receiving a favorable hearing, as well in respect to the numerous and patriotic body whose views we are especially charged to present, as from the subject, which addresses itself so powerfully to the representatives of the people, to whom has been committed the high trust of guarding the interest and advancing the prosperity of our common country.

What is the present condition of the state? What its means for improvement? And in what way are these means to be most effectually applied? These are the interesting questions to which we have been directed most respectfully to invite your attention; and which, as your memorialists humbly conceive, are of such high public concernment. In examining into the condition of the state, whether we advert to the past, or view the present, whilst much may be found to warm the breast of the patriot, there is but little to gratify the pride, or to stimulate the enterprise of the citizen. We may, indeed, proudly boast of the exalted character of the nation, and claim for our citizens the most devoted attachment to the union of the states; that there has been engrafted into our own constitution those principles of rational freedom, the soundness of which has been so fully proved in the success of that representative system which constitutes our pride and boast as a nation; conferring a degree of freedom on the governed unknown in the old world, and securing to industry its rich reward, peace and plenty; that the increase of our population, agriculture, manufactures, and advancement in the arts and sciences; and in civilization, have been rapid beyond all example; that these national blessings inspire confidence as to the high destiny of the republic, and call forth sentiments of gratitude to the Supreme Disposer of all events. But whilst we may thus boast of our rapid advancement as a nation, we regret to say, our own state shares but little in this general prosperity. To prove this, facts must be submitted, however mortifying to our pride, or painful to our feelings. In the apportionment of representatives among the states, under the first census, North Carolina and N. York were equal, each having ten members. What is likely to be our rank in comparison to New York, under the census soon to be taken, embracing a period of fifty years? She will have exceeded her forty members, whilst our state will return, or barely exceed, her original ten. What a startling contrast! Yet, in point of territory, North Carolina has her fifty thousand five hundred square miles, whilst New York only exceeds it by two thousand one hundred and twenty-five. At the first period, our population was nearly equal; whereas, at present, she will exceed two million, whilst ours will be but a fraction beyond seven hundred thousand. Yet this immense difference is not to be ascribed to our climate or soil, but in part, at least, to the rapid tide of emigration. There, every thing has been done to improve the condition of her people—here, our citizens have gone, with the bible, encyclopædia, and the axe, those pioneers of civilization, to give population and character to the wilderness of the west. In this way, more than half a million of our people have left the place of their nativity, and carried with them wealth, talent, and enterprise. It may gratify our pride, to be told in one congress there were nine senators, native born citizens of N. Carolina; yet the fact only proves how much we have lost by failing to render our people prosperous and satisfied at home.

We might pursue this inquiry still further, and examine into the rapid growth of our sister states; but we flatter ourselves that you, as we feel assured every patriotic citizen, to the question, whether the state shall remain in her present condition, are prepared to reply most emphatically, NO! If so, this brings us to the second inquiry, an estimate of the means of the state.

Stocks.

In the Bank of the State,	$500,000
In the Bank of Cape Fear,	520,000
In the Buncombe Turnpike,	5,000
Roanoke & Cape Fear Navigation Companies,	82,500
Wilmington and Raleigh Rail-Road,	600,000
Bonds for the sale of Cherokee lands, in 1838, and of a prior date;	350,000

The cash balances in the public treasury are not included in the above estimates, as they may be required to meet current expenses, and other necessary appropriations. The state, then, has a capital of more than two millions, vested in productive stocks, and in bonds on interest. It is true, a part of this sum is pledged as a literary fund; but it is equally true, we presume, that no part of the principal of this fund is to be used, and that it will continue to increase, until the interest accruing on it may be called for, in purposes of education and of free schools. The state is free from debt, and has a credit supported by her natural resources, and the habits and manners of her citizens. The taxable property of the state may, as the committee think, be estimated at near two hundred millions of dollars. She comprises thirty-two millions of acres of land, which may be estimated at two dollars the acre; she has three hundred thousand slaves, which may be valued at three hundred dollars each, besides the private stocks, merchandize, and other property, subject to taxation. But it is not proposed to resort to taxation, nor is it necessary to carry out the views and plan of

those, in whose name we have been authorized to address you. These matters are merely referred to show the ability of the state, and the ample means she has to sustain that credit, which it is proposed to bring into market.

Having shown the condition of the state, the necessity and demand for a change, and the means for effecting it, your memorialists are brought to the interesting question, as to what is best to be done? In answer to that question, we have to present to you that plan or system which was the result of the anxious deliberations of those in whose behalf this memorial is presented. No higher evidence could be given of the actual wants of our people, and of the demand and necessity for something to be done, than in the voluntary congregation of that assembly, whose wishes and opinions we have been directed to make known. A body comprising near 200 delegates, selected from forty counties, men of character, of intelligence, and of wealth, voluntarily obeying the call of their country, argues a deep distress in the community, and a loud demand for its remedy. The strifes and struggles of party have been silenced, and the voice of patriotism alone has been heard, invoking you to action. It is the first and dearest privilege we enjoy as a free people, that by the fundamental principles of our government, every plan for changing our condition and promoting our happiness and prosperity, both in choice and execution, must originate with or be sanctioned by the people. The plan, then, which we have the honor to present, originated with a large portion of the people, and claims your most liberal and attentive examination. Your memorialists shew, that after a week of earnest and anxious consideration, the convention agreed upon a plan which is embodied in a series of resolutions herewith submitted, and annexed to this memorial. The convention came to the conclusion, with great unanimity, that all the works mentioned in said resolutions were of a great and useful character, and constitute a system of improvements which, if begun and successfully prosecuted, would eminently conduce to the prosperity of the state, both as increasing the commonwealth and in elevating and confirming its moral and political character.

Of the merits of the general system recommended, it is proper to say, whilst there existed a difference of opinion as to the grade or class of the respective works, yet there was none as to their eminent utility and meritorious claim to the aid and patronage of the legislature. But the convention was admonished, as all must be, by past experience, that the works proposed must be brought within the available means of the state, or all would fail. Hence the necessity and expediency of a classification. In this, too, they were following the example of the national legislature, in their works of harbors and fortifications. What the nation could not accomplish with its ample resources, it was not to be expected a single state could effect, with its limited means, though confined to works within her own borders. Here then collision begins, here is the danger of failure, and here the demand for disinterested and enlarged patriotism. Hence it is deemed important that your honorable body should be fully and candidly informed of the reasons and views, which influenced the convention in recommending certain works for prompt and immediate execution. Let them not be charged with selfishness or with local preferences, but remember the difficulty of the subject and the necessity for action.

1. A guarantee by the state of five hundred thousand dollars to the Gaston and Raleigh rail-road. This is not a subscription or a loan, and does not call for any expenditure. It is a mere loan of the credit of the state, upon such surety as the legislature shall require to enable the company to obtain a loan on better terms than they otherwise could do, and thus be enabled to complete their great work. This favor appeared so reasonable in itself, as to meet with but little opposition. It is deemed due to the liberal spirit of those enterprising citizens who had been willing to risk their own fortunes in so great a work. It also recommended itself to the convention, as a work penetrating to the capital of the state, there to be connected with other works, and accommodating many of our citizens in the transportation of their produce to market. Having already received the favorable action of a committee of both branches of your honorable body, more is not necessary to be said.

2. A subscription by the state of *four-fifths* of the capital stock of the Fayetteville and Yadkin rail-road. This is one of the great works in the general system, and may be considered as standing at the head of those recommended in the first class. In regard to this work, the convention had certain data, both as to its necessity, its importance to a large portion of the state, its policy, as sanctioned by a vote of the legislature and of the people, and certainly as to the cost of its construction. As to the work itself, it is to connect the east and west; to commence with a home market, from the banks of a river, rising and terminating within our own limits; to be extended for the present to the Yadkin, a stream which passes through a productive and populous section of the country, and whose product must be carried to a distant foreign market, unless this great work shall succeed. As early as 1815, the idea of connecting the waters of the Yadkin with that of the Cape Fear, received the favorable action of the legislature. But unfortunately the geological structure of the intervening country presented difficulties not then to be surmounted by a canal, with the limited means of the state. Those difficulties disappear, however, before the mighty engine of steam. The actual extent of internal communication, by means of rivers and roads, which directly or indirectly connect itself with this road, cannot be estimated at less than thirty counties, embracing at least 15 millions acres of land, and probably much exceeds that quantity. Thus will the occupants of moderate sized farms be enabled to make outfits for market in their own vehicles, and for which the power of a single horse will be quite sufficient to reach some depot on the main route. Also in securing, what every farmer in the country will know the value of, a much smaller portion of time in the accomplishment of the object. For it is to be remembered, the great advantage of the rail-ways, over all other means of conveyance is the saving of time, the annihilation of space. *Time is money*, and the attainment of greater speed and certainty, amounts, in effect, to a reduction of expense. The advantages of a more speedy conveyance, are often of greater va-

lue than the whole charges of transportation, and those advantages can never be so fully realized, as by the use of rail-ways. These are a few of the rich advantages, which are to be extended to so great a portion of the people of our state, by means of the proposed route. This produce is first to be brought to Fayetteville, whose capital will increase, as calls may be had for its employment. Where prices may be now considered low, they will rise by demand and competition to the highest rates. It is then to descend to Wilmington by means of steamboats, whose number will also multiply as has been the case on the Ohio and Mississippi. From thence it finds its way to foreign markets, through Cape Fear inlet, which, if not the best, has its advantages. The tables annexed, show the tonnage employed in the foreign trade, entered and cleared at Wilmington from October 1836 to October 1837; also the tonnage employed in the foreign trade of the ports of Norfolk, Petersburg and Richmond, for the same time, as taken from the report of the Secretary of the Treasury.

From these tables it appears, that in the year 1837, the tonnage entered and cleared in the foreign trade from Wilmington exceeded that of Norfolk 6,384 tons, and exceeded both the ports of Richmond and Petersburg together 17,694 tons. We are informed, on high authority, that the coasting trade of Wilmington employs a greater tonnage than her foreign trade. We have not the means of ascertaining its actual amount, as it is not reported. If this be true, and we believe it to be so, not only on the high authority from which we received it, but because we know the maritime trade of N. Carolina is principally a coasting-trade—it would follow, that the tonnage employed in the trade of the port of Wilmington is greater than the three great ports of Virginia, Norfolk, Richmond, and Petersburg.

The port of Wilmington possesses two advantages over most of the other ports in the United States, which cannot fail to be highly estimated. 1. It is a *fresh-water* port, and vessels are exempt from the destruction to their bottoms (unless coppered) occasioned by the salt-water worms. 2. It furnishes the most miscellaneous cargo of domestic products of any port in the union. All kinds of bread-stuffs, rice included; naval stores of every kind and of the best quality; lumber, the very best in the world; staves and heading; cotton, whiskey, &c. &c. So that vessels can supply themselves with a cargo from that port, that cannot fail to suit some market, and make a profitable voyage. Again, that steamboats have been plying on the Cape Fear as high as Fayetteville, for the last 20 years; and we are assured that no serious accident has ever occurred during the time. Like other rivers in the south, its navigation is suspended in the summer months, and so is the great Ohio. We learn that the navigation of the Ohio, from ice and drought, is suspended, on an average, six months in the year, whilst that of the Cape Fear is suspended not more than four and a half months, and that at a season when the crop is not ready for market. Such are the advantages of the Cape Fear inlet, under circumstances as they now exist.

We have said the policy of building this rail-road has been sanctioned by the legislature and the people. We have only to advert to the fact of the incorporation of the company and a subscription of two-fifths, under the authority of a law of your last session. Has a single member been ousted of his place in consequence of the vote thus given? As far as we know, or have reason to believe, not one.

But we are here met with the objection; the plan proposed changes the subscription by the state from two-fifths to that of four-fifths. Why this change? The answer is to be found in the fact, that unless it is made, the road cannot succeed. A survey and estimate have been made, under the direction of the most experienced engineer in the United States, a North Carolinian feeling for his native state all the ardor and zeal of a most devoted son, from which it appears, to construct the work in the best possible mode and in the way which meets his sanction, would cost TWO MILLIONS of dollars. To raise two-fifths of this sum, by means of private subscription, has been found impracticable. But should the subscription of the state be changed, as proposed, we are well assured the amount will be most certainly taken by individuals. This is recommended not only from the magnitude of the work, its accommodation for such a large portion of the state, but from the further fact, it is to constitute one of the connecting links, the great trunk, in which others are hereafter to share. These with the convention, were held as conclusive facts and reasons to justify the change.

3. The incorporation of a company for the opening of an inlet at the foot of Albemarle sound, near Nagshead, and a subscription by the state of three-fifths of its capital stock. This work was deemed by the convention of the highest importance, from the fact of so many of the rich counties in the north-east part of the state being directly interested in its success; from the quantity and quality of the produce which would find a market through it; and from the fact that it has been long pressed upon the notice both of the national and state legislatures. Albemarle sound runs in a direct east course from the conflux of its head-waters, the distance of some eighty miles, and at its eastern extremity is separated from the ocean by a narrow strip of sand-bank, some hundred yards in width. It is navigable within four or five miles of the ocean, where its waters separate into the Roanoke and Croatan sounds, and change its direction nearly south—Roanoke island between them. These two sounds unite again, and some twenty-five miles from the point where the current of the Albemarle changes from an east to nearly a south course, they enter the Pamlico sound. From the north-eastern extremity of the Pamlico is, fifty miles distant, the Ocracoke inlet, the only navigable one for vessels suited to the coasting trade. It is proposed to throw a dam or other construction across the Croatan sound, and thus force the waters of the Albemarle to break their passage through the bank at its foot into the Atlantic ocean. It is estimated by intelligent seamen accustomed to the navigation of this coast, that through the proposed inlet, double the number of voyages may be made as are now made through that at Ocracoke. It has been estimated by a member of the convention, that the 12 counties in North Carolina, nearly all the produce of which seeks its market through the Albemarle, export not less than from four to six

millions of dollars annually. This produce consists of corn, cotton, wheat, fish, peas, and an immense amount in naval stores and lumber. These articles are nearly all of such bulk as to forbid a deposite between the place of production and sale. Hence the importance of its being received from the wharves and rivers of the producers and carried at once to the ocean for its final destination. To the fishing interest the success of the work is of peculiar importance, as the annual tribute from abroad for this article alone is estimated by gentlemen from that section of the state at $300,000. This work has also been examined and estimates made, under the authority of an engineer of the state and of the United States. They differ greatly as to the cost, which may be owing to the material and the manner of constructing the work. But however, uncertain this may be, the people in that section of the state, it is said, are willing to risk their own capital in its success, and think a subscription not exceeding 500,000 dollars by the state, would render it certain. If so, the convention was of opinion it should be granted.

4. The payment by the state of the balance, 150,000 dollars, of its subscription to the Wilmington and Raleigh rail-roads ought at once to be made. The convention came to this opinion as an act of justice to the very liberal and spirited exertions of the private subscribers, in having risked so much on their part for so great a public work, and from the certainty, as well as from the progress made, as the high profits expected, that the work must and will be finished. The prompt payment cannot injure the state, and will greatly aid a spirited portion of her citizens.

5. The survey of Neuse and Tar rivers, with the view to steamboat navigation, and if found practicable, that the board of internal improvements be authorized to contract for effecting it. Those rivers are the property of the state, the charters granted for their improvements having been long since forfeited. It is proper then, that the surveys should be had at the expense of the state, as due to her citizens, who will use them for their produce, as well as from the fact that one of these rivers is so directly connected with the prosperity of one of its markets, Washington, which has heretofore been sustained with so much spirit, but which has recently suffered so severely by fire; whilst the other leads to an old town, which has many claims on the liberality of the state, besides its direct connection with the great rail-road in which the state has so deep an interest.

6. A survey from Raleigh, *via* Hillsborough, to Greensborough, with the view to a McAdamized turnpike road, a company and a subscription of two-fifths by the state. This route is recommended from the fact, that it is to take the main line of travel from the seat of government to the western counties in the state; that it passes through two among the largest and most productive counties in the state, whose people are farmers, deal principally in the necessaries of life, own their own vehicles, accustomed to their use, and, without this road, can share but little in the direct advantages of internal improvements. Besides, it is for the present to terminate at one of the most flourishing inland towns in the state, Greensborough, which has its flourishing schools, its steam-mills, cotton factories, and in every way its population is both active and enterprising. A cheap and speedy mode of reaching a market, as we learn, would often enable the enterprising proprietor of her cotton factory to send the product of his establishment to the city of New York, and realize a profit of two or three cents on the pound. This profit would not operate to his advantage alone, but to that of the grower of the raw material. The proposed survey would cost but little; and the road, if McAdamized, would not likely exceed, according to the estimate of the board of internal improvements, $3,000 per mile, and a part of it, possible one-half, would be an ordinary turnpike, the cost of which would not exceed $200 to 300 per mile. The road, in justice, ought to belong to the state, except that experience has shown, to construct and keep up such works, calls for individual interest and attention; otherwise they constitute a continual drain on the public treasury, and end in ruin. From this line, a branch might hereafter be extended, with great propriety, to some eligible point on the Dan river; and thus give to the people in that fertile region, the means of reaching, if so inclined, the markets of their own state.

Such are the works as placed in the first class of the plan proposed by the convention; such are some of the views and reasons which influenced that body in recommending them. If any one should object, that his work ought to be placed on equally favorable ground with the most favored class, he should pause, consult the means of the state, and then ask himself, "if such a plan had been adopted but five years ago, would not my wishes now be gratified?" Time marches rapidly; and a few years, as we trust, will serve to bring into operation the whole scheme, and others, if their claims and advantages shall hereafter be disclosed and properly pressed.

Second class.—These as will be seen, contemplate a connection with the two great rail-roads now in progress, as well as with the proposed road from Fayetteville to the Yadkin. The Beaufort road, leading from the fine harbor at that place, is the most important from that fact, as another outlet will be thus opened to the ocean, and the produce of the upper country will then find additional means of being shipped to any portion of the commercial world. The inlet at Beaufort, is said to be not only the best in our own state, for its depth of water, having from 22 to 24 feet on its bar, but it is not to be surpassed by any other from the Chesapeake to Pensacola. Why then, it may be asked, was not its rail-road placed in the first class? The answer to a majority of the convention, was plain and satisfactory. It has no produce, no capital; these must be brought from a distance. One great trunk in connecting the east and west, was deemed sufficient. A road from Beaufort to Raleigh, and thence to the west, had been authorized, and it totally failed. The convention had no reasonable grounds to believe that it would prove more successful at present. Two connecting roads were too expensive to be undertaken at the same time by the state, and her true policy forbade it. Hence, the one from Fayetteville was selected as most likely to succeed, as required by the pressing demands of our western citizens, as leading to markets in which capital is already employed, and as having an outlet that might answer present demands. Again,

when the western road shall reach Fayetteville, you are still on the descending line, and from thence may be carried to Beaufort. Such, it is believed, will be the quantity of produce from the upper country as will hereafter force itself to the best market. In this way, what the friends of Beaufort cannot do for themselves, will be done by others.

The loan of three millions to be contracted by the state. It has been already shown, in estimating the funds of the state, she has upwards of two millions invested in a way, whilst they will prove productive, are not likely to be embarrassed or squandered. By the system proposed, this fund is not to be touched, but to be held as a guarantee to sustain the credit of the state in the negotiation of a loan, and a surety to her own citizens against any contingency which may arise. The maximum of the loan is three millions; and the money, when borrowed, will be mostly expended amongst ourselves; and for it the state will hold certificates of stocks which will be productive, and will in themselves constitute an additional surety against any future calls upon her own citizens. These stocks can at any time be brought into market, and thus relieve the state against any pressing embarrassment. The debt will be postponed to a future period; the works will progress; the burthen will be divided betweeen posterity and ourselves; and in this way the estate which our children are to inherit will be improved, our own condition relieved, and means provided for them to meet the claim which has been entailed in order to its improvement. This accords with the most rigid principles of justice, prudence, foresight, and economy. The estate is fast going to decay; our people are not in a condition to make the necessary repairs and to improve it, without a resort to loans. This state of things has not been brought about from any want of frugality in our expenditures; of forbearance in contracting debts, or from any extravagance or want of system in the proper and judicious management of our domestic concerns. At no former period in the pecuniary affairs of the state, has there been less extravagance, and yet at no period has it been found more difficult to keep free from embarrassment. The evil is to be found not in any passing events, but in the want of a proper encouragement to the products of our soil, and in the fact that our most wealthy and enterprising citizens are driven to more genial climes.

If we look to our sister states, most of them will be found in the march of improvement, and their citizens contented and happy. Yet, they have resorted to loans; and experience proves, so far from ending in injury to the people, they have the more rapidly advanced to wealth and prosperity. And this too, without any resort to taxes; the profits from the works having been quite sufficient to meet the interest and provide a fund for the payment of the principal. South Carolina has but recently subscribed one million to her great rail-road, guarantied the loan of two millions more, and by way of relief to her favorite city from a heavy calamity, added two millions more to her debt. But we forbear to press this matter further, as it is idle to talk of embarrassing the state by contracting a debt of three millions of dollars.

If our forefathers, with not half of our means, limited as they are, when dissension, faction, and treason lurked in every neighborhood; when the property of the citizen was liable to seizure by the enemy, and to wanton destruction by the traitor, when the assassin beleaguered his path by day, and threatened his repose by night; if, at such a time, and under such circumstances, that band of patriots could bear up for a period of seven years, under a debt of seventy-five millions, let us not talk of embarrassment by the sum proposed, having, as the state has, the ability to raise it without a resort to taxation. The only question that can admit of discussion is, not the ability of the state to raise such a sum without prejudice to her citizens, but whether she, in her sovereign capacity, shall engage in a system of this kind at all. And can we, at such a period as this, with all the light of experience before us, be seriously called upon to discuss such a question? Will you leave these matters to individual enterprise, when every state in the union has undertaken the system with so much success? At the close of the memorable struggle to which we have just referred, North Carolina had her territory and her population. Her territory still remains; Mecklenburg, Moor's creek, King's mountain, and Guilford, are landmarks which time cannot raze from the page of history. But where is her population? Where the monuments of her improvement? Her population is fast leaving her, and her monuments, we fear, are only to be found in the record of things past.

Is this state of things to continue? Or are we ever to be roused to action? It is much to be feared, if you shall separate without doing any thing, the cause of internal improvement will have sustained a shock from which it will be difficult to recover. The patriotic feeling which now warms and animates the citizen will become chilled by your apathy. It is our part, in the name of a respectable portion of the people, to advise; it is for you to act. By rejecting the plan proposed, and doing nothing, you may seal the fate of internal improvements. By acting, you incur no risk that can, in any reasonable probability, embarrass the state. But you stay the tide of emigration, now draining the life-blood of the commonwealth; you stimulate the farmer to new exertion and improvement; you invite the capitalist to open the rich bowels of the earth and to bring forth its hidden treasures of iron, copper and coal; you every where encourage the mechanic and the man of enterprise; you open new streams of wealth, running in different directions, in different dimensions, and at different heights; but watering, adorning, and fertilizing the fields and meadows through which their courses are led. Again, we ask, can you hesitate? We tell you the spirit for improvement is abroad in the land; that it invites you to awaken to the true interest of the state; to burst the shackles of a jealous and short-sighted policy; to rise triumphant over physical obstacles, and the still stronger mounds of local prejudice; and by your action, to elevate our beloved state to her proper rank, as one of the political members of this great confederacy, and let her shine with a new light amid the stars of our national galaxy.

R. M. SAUNDERS, *Chairman.*
JOHN H. BRYAN,
LOUIS D. HENRY,
L. H. MARSTELLER,
HUGH McQUEEN,
JAMES ALLEN,
T. L. CLINGMAN.

December 20th, 1838.

Resolutions of the convention.

1. *Resolved*, That the convention concur in the report of the general committee, that the several works of improvement therein recommended deserve the patronage of the state, and ought to be effected.

2. *Resolved*, That in order to carry out the views of the convention, and at the same time, to accommodate them to the means and ability of the state, a loan of three millions of dollars ought to be contracted.

3. *Resolved*, That in the prosecution of these several works, the convention recommend the following classification:

First Class.

1. A guarantee by the state of five hundred thousand dollars to the Raleigh and Gaston rail-road company.

2. A subscription by the state of four-fifths of the capital stock of the Fayetteville and Yadkin rail-road company.

3. The incorporation of a company for the opening of an inlet at the foot of Albemarle sound, and a subscription by the state of three-fifths of its capital stock.

Second Class.

1. A rail-road from Beaufort harbour to connect with the Wilmington and Raleigh rail-road, and a subscription by the state of four-fifths of its capital stock.

2. A rail-road from Raleigh to intersect with the Wilmington and Raleigh rail-road, at or near Waynesborough, and a rail-road from Raleigh to Fayetteville, and a subscription to each, of two-fifths of the capital stock by the state.

4. *Resolved*, As the opinion of the convention, that the balance of the subscription by the state to the Wilmington and Raleigh company ought to be paid without delay; that surveys of Neuse and Tar rivers, with the view to steam navigation, and the survey of a route from Raleigh *via* Hillsborough, to Greensborough, in Guilford county, with the view to a McAdamized turnpike road, ought to be made by the state; and if the said rivers should be found such as to justify the use of steamboats, the board of internal improvements be authorized to contract accordingly. And that a company be incorporated for the construction of the said road, and a subscription of two-fifths of its capital by the state.

Wilmington tonnage entered and cleared.

American vessels, -	12,378		
Foreign " - -	3,827		
	16,205	Entered, - -	16,205
American vessels, -	25,600		
Foreign " - -	3,929		
	29,529	Cleared, - -	29,529

Virginia tonnage entered.

Petersburg, American vessels,	3,693		
Richmond, " " -	2,822		
Foreign " -	1,197		
	7,712	Entered, -	7,712
Norfolk, American vessels, -	4,357		
Foreign " -	10,000		
	14,357		14,357

Virginia tonnage cleared.

Petersburg, American vessels,	2,748		
Richmond, " "	13,240		
Foreign "	4,340		
	20,328		20,328
Norfolk, American vessels, -	12,771		
Foreign " -	12,222		
	24,993		24,993

On the operation of magnetism, and of time, in improving the temper of steel and the sharpness of fine edged instruments. A certain cure for the piles.

To the Editor of the Farmers' Register.

Watkinsville, Clarke co., Jan. 26, 1839.

I read somewhere, a long account of the reason why a razor dipped in hot water shaved easy. The writer concluded the reason was very plain; for, said he, by way of illustration, it depends upon the same principle why a hot knife cuts butter or cheese more easily than a cold one; it melts and softens as it goes, thus making a way for itself. This observation induces me to send you a disertation on shaving, which may be, like the disertation on man-midwifery, fit to be read sometimes, if not at all times.

Is it commonly known--have I learned it somewhere and forget where, or is it an observation of my own—that surgeons' instruments, razors, or any instruments requiring a good temper and fine edge, are greatly improved by being charged with the magnetic principle? If it is new, it should be made known that the load-stone can improve the temper of steel far exceeding any other known plan. The effect it has on the edge of a razor, lancets, or any thing of the kind, is astonishing. Charge a needle with magnetic principle, make it sharp, and give it to your good wife, and she will notice the difference. Therefore, the first step towards taking off the beard easily, is to have the razor rubbed with load-stone.

Again, it is a known fact, that newly tempered steel is always defective. It improves with age, and, I believe, would continue to improve to an unlimited number of years. This fact is commonly known; but a wromg reason is given for it. It is generally believed, that in old times the tempering of steel was better understood than at this day. It is a common belief among surgeons, that old London instruments were better made than they are in this country; that they are better, is certain; but it is age that has improved them. Facts in proof of this position, every body can call to mind. I will, however, state a few that have come within my own knowledge. More than 25 years ago, I had a set of dissecting knives made by Brown of Philadelphia. He was directed to make them as good as they could be made, and to charge double price for them. They were found, upon trial, good for nothing, were thrown aside, and after remaining for many years neglected, I had the rust cleaned off, and sharpened. They are now as good as the best I have ever used. About twenty years ago, I had a couching needle made of a singular form, by a black-smith. The operation of couching for blindness requires a well

tempered instrument; the point must be perfect. After having it several times tempered over, I found it impossible to bring it to a perfect point. It was thrown aside as useless; not less than a half dozen times I sent to the north, and had new needles made, directing two or three prices to be offered for them, so that they might be made of the best kind; none of these instruments were as good as I wished them to be. As I frequently practice this operation on dead eyes, as well as on brute's eyes, to save my new instruments this old needle was cleaned of rust and sharpened again; and upon trial, it was now found to be the best instrument I have. I have, of late, operated successfully on perhaps a dozen blind eyes with this old instrument, and I should certainly consider it the best instrument I have seen. Some time ago, I went from home to amputate an old man's thigh. I had to use a borrowed set of instruments; and when I examined them I hesitated whether to operate. They looked so old and rough that I feared to use them. As the knife, however, appeared to take a fine edge when strapped, I proceeded to operate. After I had cut down to the bone, I passed the knife several times round the bone, pressing it hard, that the bone might be perfectly clear. As I calculated I had destroyed all edge on the knife, I concluded I would sharpen it before I returned the instruments to the good old worn out surgeon. To my surprise, I found, upon examination, that the knife still retained a perfect razor edge. I tried these instruments many ways to try their temper, as I considered them the best I had ever seen. I went to see the old gentleman, determined to own them at any price; but they could not be purchased. He informed me that they were a very old set of instruments when he was a young man and a surgeon in the army. He told me of several high officers' limbs they had amputated; that they had done much service since he had them, and that they were considered old worn-out instruments when he received them. I now inquired if he valued them because they were of superior temper. He told me they were the only ones he had ever used, and that he did not know that they were better than common; that he only valued them for their age. These are the best tempered instruments I have ever seen, and the oldest. When new, I have no idea they were better than common; in fact, every person in the habit of using tempered steel or iron, in any way, will be able to recal facts to prove that the older they are the better. It may be laid down as fact, that a newly made razor will seldom shave well, and that the older the better. Therefore, in selecting a good razor, an old rusty razor will be generally better than a newly made one; for rust also improves the temper. But even with the best mechanics, a perfect temper is only an occasional good hit; and many razors may be tried before a good one is got. The old-fashioned direction, to buy many cheap old razors, and keep trying until we get a good one, is a good direction.

Time, or age, has an effect on the edge of a razor that no art can produce. The instrument-maker, after grinding and honing a razor or other instrument, gives it a slight strapping on a bad strap, and it is finished. Now, this newly tempered razor, fresh sharpened, could not be made to shave well. The instrument-maker knows if he straps off the wire-edge he leaves it rough like a saw, full of little gaps. It would now shave very rough, but it may be months or years before the shaver uses this razor, by which time age has entirely taken off the wire-edge and left a smooth fine edge. Time takes off the wire-edge perfectly. No art can. Therefore, when we buy a new razor, (for this new razor may have been made many years,) we should select a sharp one, for we may never get as good an edge on it again; this edge should be saved as long as possible, never putting it on a strap while it will do without. By only strapping it on a clean silk handkerchief, or the palm of the hand, if the razor is a good one, it will keep its edge a long time.

But after the razor has become dull, the object is to sharpen it, and make it shave well. Observe, although time has put a good edge to the razor, the maker did not. For, in addition to other reasons why he cannot put on a good edge, his strap is in such frequent use with newly ground instruments, that it is full of particles of wire-edge, stuck in it, which, if the razor is much strapped on it to make it perfectly sharp, will make it worse. Sending a dull razor to the instument maker to be sharpened for immediate use, will always result in disappointment; therefore, this must be done at home. Every man with a hard beard, who wishes to shave easy, must keep more than one razor. Now to sharpen it, the hone must of course be a good one, and for the most part, a fine oil-stone is better than any hone. Thick oil is better than thin; therefore, use caster oil in preference to olive oil. Now bear particularly in mind, that it is wholly impossible to put a good edge on a razor if it is well tempered while cold. Rubbed as gently on the hone as we can, the edge will fly. After sharpening, pass it along the thumb and it will be rough. Examine it with a microscope, and the edge will be found full of little gaps, and an irregular wire-edge. Rub off the wire-edge, and it will be rough and wholly unfit for shaving. The only way to guard against this, (and without this caution to put a good edge on a razor is an impossibility,) is to put the blade in hot water. Make it as hot as boiling water can make it, and rub it gently on the hone with little more than its own weight, frequently dipping the blade in boiling hot water. Now if the razor is a good one, and sharpened in this way, the heat of the water expands the metal and thickens the edge so that it may be brought to a very fine edge; while at the same time, heat so toughens the edge that it will not fly. Examine it with a microscope, and it will be found to have a smooth regular edge, with a very fine wire-edge all the way; for the edge becomes so perfectly fine, that the very extreme point (so as to say) of the edge, has no substance to wear it off; and, therefore, turns up all along. Now, how to take off this fine wire-edge. Every strap-maker gives directions; and every direction, if followed, spoils that fine smooth edge that is essential to easy shaving. Rub it across the thumb nail, as directed, and examine it with the microscope, and we have broke off the wire-edge in places and made the blade full of little gaps, while in other places, we have turned the fine edge and made more wire-edge than before; go to strap it off, and, by much of the wire-edge breaking off and sticking in the strap, the strap is ruined and rendered unfit to put on a really fine edge any how,

and the razor made, in reality, worse than before. There is only one way to manage this wire-edge so as to enjoy the luxury of easy shaving in full perfection. Time is the best and only doctor; therefore, bear in mind this direction: after the razor is sharpened as above directed, wipe it perfectly dry, not touching the edge with any thing, and above all things, not touching it on a strap; put it in the case or wrap it up, and put it away. The longer it remains untouched, the better; but three months at least will be required, for time to take off this wire-edge. How time acts upon the razor's edge is not the question, (although it admits of explanation;) the fact is what we want; and who ever will try it will find it so. After letting the razor remain three months or longer untouched, it is now fit for a shaving; but before beginning, tie one end of a silk handkerchief to something, holding the other in the hand, and strap the razor sometime on it, then on the palm of the hand; let the razor be cold during this strapping, as we want a little brittleness about it, that any particles of wire-edge which might still remain may break off, thus preventing them from sticking on the strap and spoiling it. Now dip the blade in boiling hot water and apply it to the smooth side of one of Mechis' magic straps, lathering the face and dipping the razor in hot water as usual; and the beard may be mowed off not only so easy that it cannot be felt, but the razor will shave so perfectly easy and smooth, that it will shave the beard *lower than the surface of the skin.* is as absolutely necessary, if we wish to shave in full perfection, to dip the razor in boiling hot water while strapping, as it is while honing it.

Now there is another important item to be noticed, if we wish to shave easy, no matter how good the razor is, and how well all these preparatory steps are followed. Constant use injures the temper of the razor, and if it is not rested it will fail to perform well. Metals when frequently strained loses their tone, and require time to recover. A spring in constant use weakens, but recovers from rest. Sportsmen know, that by very often shooting, their guns and rifles become what they call crazy, and will not shoot well until they are rested. Razors that are kept in constant use are so often heated with warm water, and thereby expanded and put on the strain, that after a while they lose their tone or temper, so that they will not bear as good an edge as they before did. It requires something like three months rest for them to recover their temper again. So that if the plan be adapted of always using several razors, and whenever one is honed, letting it remain three months or more before it is used, it will also recover its temper, and it will not become too soft from constant use. Not only will the man who has a rough beard find benefit from the position I lay down, that steel or other metals are not fit for use immediately after tempering, but others who have use for well-tempered instruments or tools, will derive benefit from observing it. The farmer who will, as soon as he has finished his crop, have all his ploughs pointed and tempered, and put up till next year, will find that the points that he has had on a year will last nearly twice as long as those that are put on and put into immediate use.

But why does the razor shave more easy by dipping in hot water? It cannot be from its softening or melting effect on the beard; for, after the beard has been well lathered with soap and warm water, it is hardly presumable, that what heat might be in the razor blade would soften it much more. In addition to which, it is perhaps noticed by most of men who have hard beards, that the razor will not shave so well if it is too hot; to shave easy, it must be dipped in hot water, and then *getting cool* before it is applied to the face. Two reasons should be given in explanation: first, because when the razor is used cold the temper is so high and the edge so fine, or thin, that it will fly and become full of little gaps; whereas, by dipping it in warm water the heat expands it and gives it a little toughness, or by softening it a little takes away that extreme brittleness which makes it break. Shave with a razor that is hot and one that is cold, and examine them with a powerful microscope, and the difference will be very plain. Again, if we consider the shape of a razor blade, and consider that heat expands, the back is much thicker than the edge, and will retain its heat longer; therefore, the back more heated and expanded than the edge, would cause the edge to be on a strain and brought to a more perfect edge. In dissecting out large tumors and other surgical operations, where very sharp knives were required, I have always kept the knives in a bowl of hot water, and changed them as they became cool.

I will now give you a medical prescription, if you do not think it too much out of place. I would wish it published, too, for those who may be so unfortunate as to have use for it. If it acts as kindly with them as it has with me, it will be invaluable. Having to practice physic in a rough country, I had to ride on horse-back. Although I always secured the most easy saddle-horses I could procure, yet I soon found constant riding produced piles. I could not begin to describe how much this wretched disease has pestered me, not only in point of the distressing pain I suffered, but at the very times when I was most busy, and my services most wanted, this unwelcome affliction would be most afflicting. After disabling me from attending to business, or causing so much pain that I felt like any thing else more than attention to professional duties, I thought I had tried every plan that the ingenuity of man could suggest, without doing much good or harm. As a last resort, that nothing should be left untried, I sent to an old woman, who was noted for curing piles, for some of her infallible ointment. Fearing I might lose confidence in the old witch's remedy, which she affirmed never failed, I used it as she directed, without examining its composition. As it did no good, I then examined it, and found it to be lard, rubbed with a lead pestle. As my own treatment, as well as all other plans suggested by medical men, did no good, I endeavoured to become reconciled to endure it, hoping at any rate, it would get no worse. In this I was disappointed, for although the many remedies tried did not cure, yet they kept it at a check; for so soon as I gave over trying, it became rapidly worse. I now, from theorising on the disease, concluded to try a plan which, to me, was new. I have never, that I recollect of, seen or heard of its being tried before; but be it old or new, its success is the object. When tried, it acted as a balm, and so far, as a perfect cure. It is this: Take a piece of patent lint, or linen cloth, spread upon it

some Turner's cerate, (some tallow or any mild ointment would do as well,) in the middle of the plaster put some calomel, say 20 grains, and every night apply it to the piles, letting it remain all night; the relief will be almost immediate. Continue it till cured, and when the disease appears disposed to return, apply it again. I have recommended it to a number. Calomel, to piles, is as certain a cure as tooth-pulling is for tooth-ach, and the only remedy I know of worth using.

ROBERT R. HARDEN.

For the Farmers' Register.

MARSH-MUD AS MANURE. BLUE MARL.

In the last No. of the Register, you solicit information in relation to the application of marsh-mud; I have made several short communications to the Register on this subject, and have but little to add.

I commenced the use of marsh-mud, on a large scale, in the year 1828, and have never been disappointed in its effects. In stating my opinion of the relative value of marsh-mud and marl, in 1834, I observed that mud would cease to benefit, after a few years' cultivation. Experience has convinced me of its more durable effects, and I now say, with confidence, that mud taken from a ravine, on a salt-water river, where vegetable accretions, and the washings from a good soil, have gradually surmounted the tide, is more durable in its productive qualities than stable or barn-yard manure.

I made a small experiment with marsh mud in 1824. Last season I cultivated the field in corn, where the mud had been applied; though by reason of the drought, nothing grew well, the durability of the improvement was manifest, by comparing it with the corn on the adjacent lands. This year I propose applying marl to lands heretofore covered with marsh-mud; and, if your theory be right, that marl will give permanent effect to putrescent manures, I calculate those lands, under a moderate system of cultivation, will, for a long time, require no farther improvements. That lands should be manured for every crop of wheat, as they are in Pennsylvania, I readily agree; but in a country which depends almost exclusively upon grain, labor has become a very serious matter. The free people of color, for the most part, go to the cities, where their career is generally short and we cannot purchase slaves at Mississippi prices. I have no knowledge of the profits of slaves sold to the planters of the south; but I know of no instance of a successful emigrant, with his slaves, from this part of the country. Some of them, after a short absence, have returned with large credits to purchase slaves, and with very seductive accounts of the profits of cotton and sugar plantations. A few years have generally sufficed to wind up the concerns of these adventurers, by death, or insolvency, and generally by both; and I am much inclined to think that if the slave-holding emigrants, or their representatives from this part of the country, could settle a general account, they would find the balance as much against them as it was with the Baltimore privateers-men at the conclusion of the last war. I do not mean to say, that all who go to the south fail. A sharp fellow, whose morals subserve his wits, will make money at any place where he has room, and his success (at least for a time) will be certain, if he has the good fortune to get to be a director of a paper bank. But a Virginian or a Marylander, who had grown up under the influence of moral habits, and checks derived from his parentage and education, would feel strange in a country where the Lynch-law is part of their code, bowie knives of their dress, and where whigs, democrats, nullifiers, members of the legislature, members of the church, and ministers of the gospel, circulate "Oakland notes," he would hardly feel himself justified in taking a hand in this game, or as if one of these holy men, would join him as a partner.*

I know a gentleman of this state, who, from small beginnings, by prudence and industry, had realized a handsome fortune, sufficient to supply him with all the comforts and many of the elegances of life; he had also been a successful politician; and in a evil hour, was induced to think, by bad advice, that his time and capital was misspent in cultivating tobacco, wheat and corn, on a beautiful farm, which had been improved under his care and direction. To make his fifty thousand a million, he purchased a large tract of land, on some of the waters of the Mississippi, and sent his son, with a large number of his slaves, to settle. The last account I had of the concern, was, that the entire crop of corn and cotton had been ruined by the overflow of the river, seventeen of the slaves had died of fevers, generated, by the malaria, and that the son was slowly recovering from the fever of the country, which at one time, left but little hope of life.

I feel a paternal regard for cultivators of the earth, and to those of them, who shall at any time feel a desire to become rich, by the growth of three, or four crops of cotton, or two or three of sugar, and then return to their native plains, to enjoy *otium cum dignitate*, I recommend Æsop's Fables. They are all of them entertaining, and some of them well suit their case. I recommend this book, in sober earnestness. I learnt from it in my youth, lessons of practical wisdom, some of which have served me in my journey of life.

In communications heretofore made to the Register, I have suggested that blue-marl, contained properties fertilizing beyond the lime contained in it. Farther observation has confirmed the opinion. I have worked, principally, two pits, one of blue, the other of yellow-marl. Professor Ducatel reported the latter to be richest in lime. I have applied the marl from those pits to land equal in point of fertility, and exhaustion, and have always found the fertilizing effects from the lands covered with blue-marl, more quickly disclosed, and exceeding in product. Your Professor Rogers, in the 3d vol. of the Register, page 634, in speaking of blue-marl, suggests that its coloring appears to consist of carbonaceous matter, derived, probably, from the organic materials, associated with the shells, which imparts to it, fertilizing properties. The qualities and the quantities of substances combined with matter used in agriculture, was a matter of diligent and successful inquiry, by Sir H. Davy; and I should think,

* See Dr. Hagan's letter on Mississippi banking, in Farmers' Register for December, page 729.

the constituents of blue marl, well worth the inquiries of your Professor Rogers, and our Professor Ducatel, both state geologists. What salaly Professor Rogers receives from your state I do not know; but Professor Ducatel's from ours, is fully adequate, and I think, the inquiry within the scope of his duties. RUSTICUS.

E. S., Maryland, Feb. 1st, 1839.

[The supposition of our correspondent, as to there being some other useful ingredient than the calcareous part, in blue marl, is doubtless correct. But whether the additional value thence derived is enough to be appreciated, is more than we can say. The observation of the particular facts, which will be stated in the following article, first pointed out to us, and satisfactorily, that it was the dark colored extract of vegetable matters which gave the blue color to shell-marl. And this coloring matter is undoubtedly chemically combined with the calcareous matter, and cannot be removed by any washing with pure water. The proof of this is, that in all the pits dug into the very remarkable blue marl, described below, on Shellbanks farm, water, in great quantity, passed through every part of the mass, without there being the slightest effect produced in lessening the deep tint of the marl, or affecting the purity of the water. Further—in the well dug through this bed of marl, and which received its principal supply of water from a soft quick-sand beneath, the water rose to and stood at the height of about 13 feet, and altogether in this blue-marl. Yet the water was at first, and has continued to be, remarkable for its purity and excellence.

The following statement was written to form a part of the second edition of the 'Essay on Calcareous Manures,' and was one of several portions omitted, because it was desired to include nothing that was extraneous, or not sufficiently sustained by fact, or reasoning. But though no similar particular observations have since been made, nor any experiment tried, it is proper here to state that nothing has been since learned to cause doubt of the then supposed cause of the color of blue marl; and that the time which has elapsed, and general observation, have confirmed, what then was doubtful, merely because new.—ED. FAR. REG.

THE BLUE COLOR OF MARL PROBABLY CAUSED BY THE PRESENCE OF VEGETABLE MATTER.

[An omitted note, written for the 'Essay on Calcareous Manures.']

A fact which has very recently fallen under my observations, seems to throw light on the cause of the blue color of some marls. I will, however, merely state the facts, and leave it to others to reason as to the causes.

There is one body of marl at Shellbanks of very uncommon appearance. The upper part is dry and yellowish, soft, and as fine and even more yielding than sand; which is similar at the tops of many other beds. Below, it is wet and firm, but still yellow for some six to ten inches. Still lower, and without any perceptible change of texture, there is a sudden change of color, precisely to a line, (though not quite a horizontal line,) to a deep and beautiful sky-blue; by far the most perfect blue known in marl or earth of any kind. This color continues to the bottom; as was known by having dug a well through it at a few hundred yards distance. Beneath the marl, there is a brownish quick sand, from which an abundance of pure water rose. It may be well to observe here, that whenever marl is blue, there is no other color known beneath; and it certainly was the lowest in two other remote bodies, through which I reached the bottom, on another farm. The bottom of this bed (at Shellbanks,) could not be reached, except in the well, though many pits were dug 6 to 7 feet deep in the blue marl. The whole of this wet marl, (yellow as well as blue,) consists of alternate thin layers of a fine and close calcareous clay, (apparently the true marl of mineralogists,) and of finely broken fragments of shells, few of which are larger than grains of wheat, and generally much smaller. The layers of clay vary from one-eighth to half an inch in thickness, and the layers of powdered shells fill from double to triple these different spaces. The digging is on the edge of an alluvial flat, which above is a wet swamp; and a stream passes by the marl, and nearly as high as it is wet. In digging pits, the water passed so fast through the porous layers of broken shells, and from every side, that it was very difficult to sink the digging even to 6 or 7 feet; and to get to that depth, there were, towards the last, two men kept constantly throwing out water to enable two others to dig and throw out marl.

From another body, about 400 yards distant, which was of different appearance, and showed no blue color, even at the lowest known depth, where also it was wet, some of the upper dry and fine part was taken in 1833, to floor a stable yard, for the purpose of absorbing and saving the liquid manure. The marl was covered with vegetable and animal manure, and sometimes with such filth from about the houses, as well as the cleanings of the stable. About 12 months after it had been so placed, this once yellow marl was dug into, and found to present the same deep and beautiful blue color of the former body described.

THE LAST COMMUNICATIONS OF GEORGE E. HARRISON, OF BRANDON.

The following communications were prepared just before the sudden illness which resulted in the death of the writer, only five days after the date of his letter; which event deprived the country of one of its most useful and valuable citizens. We speak of George E. Harrison solely as an improver and cultivator of the soil—in which respects his labors were among the most beneficial to the agricultural interests of Virginia, of all such that have been performed. It does not comport with the design of this publication to remark on other

subjects for encomium, however highly deserved; and it is especially requisite that we shall not be tempted, upon any occasion, to admit any such obituary notices as are customary in newspapers, which, by the frequent abuse and prostitution of praise, or want of all discrimination in applying it, have become as mere words of form; having neither fitness of application, nor truth.

Mr. Harrison's communications to the Farmers' Register were always valuable; but his too great diffidence, and his shyness of public observation, and misplaced fear of criticism or censure, restrained his pen within limits much more contracted than our wishes or the public interest would have required; and the additional value of his real signature was never permitted to be given to any one of his communications. As his scruples, on this head, (as all but himself would have considered,) were altogether misplaced and unnecessary, we shall take permission thus to state the authorship of the short communication which was designed to be published as anonymous, and also to give the letter which was meant to be altogether private. There is nothing in it that is improper to be *thus* and *at this time* presented; and the contents will be the more interesting on accounts of the fact, that before the letter was closed, or indeed entirely completed, that the writer had ceased to live. The blanks for numbers, as shown below, were left thus in the writing, to be filled by particular reference to accurate accounts of actual expenses. From Wm. B. Harrison, esq., from whom the letters have just been received, we learn that the writing of what follows was one of the last acts of his lamented brother.

The tenor of the inquiries which drew forth this letter may be inferred from the answer. The "Byrd manuscript," the publication of which, entire, we had urged on the possessor, is a folio volume of the writings of his distinguished ancestor, Col. Wm. Byrd of Westover. By the favor of Mr. Harrison, we had formerly been permitted to extract the portion of this old and curious volume, which gives the journal and account in detail, of the earliest passage through the great Dismal Swamp. (Vol. iv, p. 593, Farmers' Register.) We shall accept (if the offer be still available,) with great pleasure, the use (as restricted,) of this precious volume; and in making use of it, will comply carefully with the wishes and directions of the possessor.—Ed. Far. Reg.

Edmund Ruffin, Esq.

Brandon, January 14th, 1839.

Dear sir—I received your message by my brother, and subsequently, your favor of the 4th inst. I very soon prepared a reply, but it was so meager and unsatisfactory, that I permitted it to remain in my pocket, intending, so soon as I got opportunity, to put it in better form, and forward it to you. The engagements, however, of company and of business, have heretofore hindered me. I generally find Christmas a most harassing period, from the needful preparations for the coming year, as well as winding up the affairs of the past. These difficulties have been enhanced on the recent occasion, by my parting with a manager who had been eleven years in my service, and who had so thoroughly identified himself with my business, that I have found it hard to get along without him. Although the causes of delay I have detailed still exist in some degree, I cannot consent longer, even to *seem* inattentive to your wishes.

I should not like to engage in the publication of the Byrd manuscript, even if I felt entirely at liberty to do so. I placed it some time ago, in the hands of some gentlemen in Richmond, with authority to extract such portions as they thought proper, for the use of the Historical Society of Virginia; and I have heard that $40 had been expended in copying the selected parts. Were I so inclined, it would be necessary to confer with them before I could undertake the publication of the whole work in an independent volume. I do not, however, consider myself precluded from allowing you to publish as much as you think proper, in the Register, only stipulating before-hand, that the *relique*, which I greatly prize, shall not leave your house; that the parts chosen for publication, shall be carefully examined by you, and such alterations and corrections made as the form of the author may require; and finally, that copies in manuscript be taken for the press, instead of printing from the work itself. With these conditions, it will be entirely at your service, and I will forward it to you by the first safe conveyance.

I had rather postpone for a while, a report of my experiment with the camel-lighters in the transportation of marl. I, for some time, suspended that operation, and have but recently resumed it. I will endeavor to make some observations which shall enable me to enter more into detail than I now can. My business is so extensive, and generally, so pressing, and my amusements, *proh pudor!* so attractive, that I do not attend much to the minutiæ of things. I do not consider camel-lighters at all adapted to distant, and not well to river transportation, owing to their being unmanageable, and too much at the mercy of the wind and the tide. Their case of draught renders them particularly suitable to shallow creek navigation; and for the purpose you mention, viz: the removal of marsh-mud, I, on the whole, esteem them preferable to any description of lighter, and beyond comparison so, but for two or three objections, which are so cogent as to bring the shallow open scow into powerful competition with them. The objections to the camels are the necessity of using pumps, which are so apt to get out of order in the hands of negroes, the difficulty of stopping leaks when they occur, and should one accidentally turn over, of uprighting it. One would suppose, to look at the broad flat things, that the latter casualty never could occur; but it nevertheless, did to one of mine, and the trouble of restoring it is hardly conceivable. My lighters are 40 feet by 12, and rather more than inches deep. The cost , complete, I think, fully $. One of three-fourths the size specified, and of thinner plank, would probably answer your purpose. I merely guess at the cost, which may be very wide of the mark. A great deal of timber

is required, as every particle of sap should be rejected except from the bottom planks.

In regard to marsh-mud I have had no experience either by itself or in compost; perhaps, having been deterred from using it by Mr. Lewis' failure, which I considered decisive. If I find it convenient, I will, with pleasure, try the experiments prescribed by you, and report the results; though we are generally so much *pushed* as to have but little time for *projects*, however rational they may be. I am of opinion, that oyster-shell-lime unslacked, costs us at the kiln cents a bushel. The enclosed letter may, perhaps, enlighten you as to the price of stone-lime. I send the letter with a short article by way of introduction, which you can use if you deem them of any value. All I recollect of Capt. B. is, that he once took off a cargo of corn here, and that he seemed to be a respectable person, between whom and ourselves some civilities were intercharged, to which circumstance, I suppose I am indebted for the letter. Till the receipt of it, I had even forgotten his name.

I cordially reciprocate your expressions of friendship, and shall always be happy to meet you at home or abroad, but more especially at this place.

With kind wishes, I am, dear sir, truly yours,

GEO. E. HARRISON.

THE USE OF IMPORTED STONE-LIME PROPOSED IN LOWER VIRGINIA. LIME FOR HOGS.

To the Editor of the Farmers' Register.

I herewith send a letter from Capt. Lewis Bosworth, of Newark, N. J., whose object in addressing me will probably be promoted by its publication in the Register; and as it may be of service to some of your readers, the benefit may be reciprocal. The information it imparts comes very opportunely. The supply of oyster-shells is precarious, and entirely inadequate to the demand. Marl, doubtless the most valuable calcareous dressing, is not every where to be had, and is a heavy and expensive affair when both land and water-carriage have to be encountered. If fifty bushels of stone-lime, in the state and at the price mentioned by Capt. B., will suffice for an acre, it will be cheaper than the customary quality of shell-lime; viz: 72 bushels. If a like quantity be required, it will be rather more costly, but will present the great advantage of being attainable at any time, and to any extent. I have ordered, for myself and one of my neighbors, a small cargo, by way of experiment, and you may again hear from me on the subject.

Is it known that lime—shell-lime I mean—is much relished by fattening hogs, and is very beneficial to them? I think the fact may be relied on. I am, myself, so well satisfied of it, that mine are kept regularly supplied. The discovery was made here accidentally. The remarkable thriftiness of a large number of those animals confined in a barn-yard, into which was thrown the refuse lime from the trough used for soaking seed wheat, first led to it. The hogs were observed to eat it with avidity. Its usefulness, like that of ashes, often applied to the same purpose, may consist in its being a corrective of acidity. I have frequently, on crossing the Blue Ridge, been struck with the superior condition of the swine in the "Great Valley," and have ascribed it to the abundance of food in that fertile region. May it not be owing, in some degree also, to the healthful tendencies of lime-stone water?

H.

James River, Jan. 14th, 1839.

Newark, N. J., Oct. 10, 1838.

Dear Sir,

I take the liberty to inform you a plan our farmers have discovered in improving their lands, by using stone-lime slacked at the kilns. Our farmers have taken from the kilns here, from 2,000 to 2,500 bushels per day, in the fall and spring, in the time of planting and sowing. The factory here is but a few rods from my house, and is composed of 13 perpetual kilns, and employs 75 hands. I find four other kilns have started this season, in the adjoining towns, for the same purposes, but not as large. The thought struck me, that it would be very good for the land on the James River, and especially your neighborhood. It may be sent out to your farms, and not exceed 12 cents per bushel, at your landing. Should this meet your approbation, you will have the goodness to answer this letter, and give your opinion on the subject.

I am, dear sir,

Your friend and humble serv't,

LEWIS BOSWORTH.

VIEWS OF THE DEMAND, SUPPLY AND PRICES OF THE NEXT CROP OF MORUS MULTICAULIS.

In the last number, we submitted at length our own views upon this subject; and also gave, immediately after, (in the piece signed H. C.) the opposite opinions of one of the most intelligent agricultural writers in New England, Henry Colman, esq., commissioner of the agricultural survey of Massachusetts. We have since seen, in the last number of the 'Silk Culturist,' of Hartford, the following statement of the opinions and anticipations of its editor, Judge Comstock; and it is here copied, that all the light, and the most opposite opinions of those who have the best opportunities of being informed on this subject, may be placed before our readers. No one has had these opportunities more fully offered than the editor of the 'Silk Culturist,' and no editor or writer could be quoted, who stands higher for integrity and sound judgment. But still we consider him as much too sanguine in his expectations of high prices; and as much above the most probable results, as Mr. Colman's calculations were below them. Our position, in this matter, was between these two extremes; and we have had additional reasons, since the publication of the article referred to, to be the more confirmed in the opinions there expressed. It is, however, for our readers to compare, and decide upon, these several views.

It is proper to add here, that what was then sta-

ted as *our single postulate* for the sure result of "sufficient prices" for mulberry plants of the next crop, that is, a *bona fide* commencement of silk-culture to sufficient extent—as to Virginia, at least—is made more probable, by every later account received.

No one, even six months ago, could have anticipated the recent occurrences in this strange business and speculation; and we therefore dare not presume much upon the certainty of our present expectations of the future. But whatever may be their degree of correctness, our opinions were weighed carefully, and stated fairly.—ED. FAR. REG.

Extract of a letter from the editor of the Silk Culturist, dated Jan. 1st, 1839:

With these preliminary remarks, I now proceed to give a definite answer to your several enquiries; and, taken together, they appear to involve the general and oft-repeated question, *What will the multicaulis be worth next autumn?* Let us first look at the past. The sales of trees of last year's growth commenced with us in August. The market opened at about twenty cents, though thousands had been sold in Massachusetts and elsewhere for ten cents, and even less. Soon speculation commenced, and they changed hands at different prices, until they commanded $1, and in some cases more, under the hammer of the auctioneer. The last auction sales in New York, were a lot of very small trees, and the prices ranged from 57½ to 70 cents, equal to from 25 to 30 cents a foot, and this, I think, may be safely assumed as their present value at auction. With this brief view of the past, let us now look into the future, and see if we can form any rational opinion of their market value next autumn. However, before embarking upon the ocean of conjecture, I will state one fact, and it is a very important one in my estimation. While in Baltimore, and on my return, I ascertained that purchasers were offering twenty cents for trees deliverable next autumn. One gentleman told me he had contracted for 100,000 at 12½ cents, had been offered twenty cents for a part of them, and had declined the offer. Another very intelligent gentleman, residing in Wilmington, Delaware, told me he had been offered 20 cents for his next year's crop, and had refused the offer. He also mentioned several other instances within his knowledge, of like offers and refusals. From these facts and other corroborating circumstances, I am satisfied that contracts may be made with responsible men in Maryland and Delaware, for the delivery of trees next fall at twenty cents, and probably more. If I am correct in this opinion, it follows, as a matter of course, that the market value of trees of next year's growth, is about the same as it was of last year's growth in August. If this be so, the next inquiry is, will they advance, and if so, to what point? We have seen that they advanced several hundred per cent the last year, in two or three months, and the question is, will they advance in like manner, or at all, during the nine or ten months that must intervene between this time and the time of delivering the next year's crop? and here let me apply my rules of philosophy, and say they unquestionably will, unless the causes which produce the advance the last year, have been removed. But have they? In order to answer this inquiry, we must first ascertain what they were. The causes which occasioned the demand, and the rapid advance, were two-fold: 1st. The small number of trees in the country, compared with the great interest awakened in the culture of silk. The liberal bounties offered by the states of New Jersey, Pennsylvania, &c., for the culture of silk for a limited period, aroused a spirit of enterprise which could be gratified with nothing short of immediate action. Hence large investiments were made, for the purpose of permanent plantations, in the hope of rich returns arising from the profit on growing silk, as well as from the munificence of the government. This was one of the causes and as the laws giving the bounties remain unrepealed, we may confidently conclude, it is not removed in this respect.

But, it is said, the number will be so increased by another crop, and importations, that the country will be fully supplied, the market overstocked, and the price reduced to their actual value for feeding the worm. With respect to the number necessary to supply the country and make every farmer a silk-grower on a very limited scale, I can form no very rational conjecture; but when I look over its vast extent, and take into consideration the number required to plant an acre, I can conceive it to be almost innumerable. Though I am not aware that any calculations have been made on this subject, yet estimates of the actual number now in this country have been made, by different persons, and on different data, but with substantially the same results. All unite in the opinion that the number does not materially vary from 3,000,000. With respect to importations, but little need be said, as it has been ascertained that not more than 100,000 could be procured in all Europe for exportation to this or any other country. It is, however, believed that a few will be imported, possibly enough to swell the number to 3,500,000. Admit this then to be the number on hand for planting the coming spring, and make ten the ratio of increase, which, after deductions for ordinary losses, is certainly large enough, and we shall have 35,000,000; a large number truly, but not enough to supply the little state of Connecticut, a small spot on the map of the United States. The market, therefore, cannot be overstocked, or the price reduced by the increase of the next crop.

2d. Another cause of the last year's demand and price is of the same general character, but developing itself in a different form. Like the other, it originates in the love of money, but is less patient for its gratification. I allude to speculation; for no one conversant with the subject denies the fact, that of all speculations in this country, the mulberry speculation is the greatest. This rage for speculation in mulberry trees is not content with the rich profits which may be realized from their cultivation, but strives to enhance them by buying and selling, like other articles of commerce. So common has this practice already obtained, that it is becoming a custom with editors and publishers of newspapers to give the sales and prices of multicaulis; and the editor of one very respectible daily paper in the

city of New York has honored it with a place under his head of "trade and commerce." The fact that estates and even fortunes have been made the past year, not only by cultivating the tree, but by merely buying and selling it, has become too notorious to escape the observation of the eagled-eyed money-maker, and it is not a trait of his character to remain idle while his neighbor is making his thousands and tens of thousands of dollars, by simple stocking an acre of land with the multicaulis. This cause, then, it appears, remains, and consequently I cannot resist the conviction that the effect will continue.

But, in reply to this, it may be said, that the time will come when the country will be supplied, and prices must fall to the intrinsic value of the tree for making silk. True; and so will the time come when this world will be burned up, but where is the farmer who will omit planting his corn and potatoes next spring because that event is certain. The very fact that the time will come when the tree will fall in price, is a sufficient stimulus to men of enterprise and industry to double their diligence in acquiring a competency before it arrives. That period, like all others in the future, is hidden from us, and let us be admonished by its uncertainty, that when it does come, it finds us in a pecuniary point of view, ready. With respect to this all-important time, about which so much has been said, I know but little, having never perplexed myself about it. I consider my time better spent in cultivating mulberry trees, at prices like the present, and thereby laying up something against a rainy day, and endeavoring to persuade my friends to do the same. It is, however, the opinion of the best-informed on the subject, that when that time arrives, I mean, when the country will be fully supplied, you and I shall be at least ten years older than we now are.

Thus much for an answer to the general inquiry, *what will the multicaulis be worth next autumn?* You will perceive, I have given no definite price, nor do I intend to. I have given you a few facts and some arguments, and from them you must draw your own conclusion. I will, however, say, that I think you are within safe limits at the maximum price on which your calculations are based.

* * * * *

I somewhat doubt your being able to procure trees in the spring at the price you mention; but should they cost you 75 cents and multiply tenfold, an investment of $500 would give you 6,660 trees, which, at twenty-five cents, would amount to $1,666, and leave you a profit of over $1000, besides being in the way of profiting by all that they may advance above that price. I certainly am not disposed to hold out encouragement which will ultimately prove fallacious; but I do believe, if you adopt this course the coming spring, the autumn will find you in circumstances more favorable to a relinquishment of the labors of your profession, the purchase of a farm where you can have the privileges of which you speak, and finally, in the enjoyment of that "*otium cum dignitate*," which we all so ardently desire. Respectfully and truly yours, F. G. Comstock.

THE BOHAN UPAS OF THE WEST, A HOAX.

We have been informed by a correspondent residing in the neighborhood of St. Charles, Mo., that the account published in the St. Louis 'Bulletin,' of the enormous *bohan upas* of the west, and cause of the milk-sickness, was simply a specimen of that choice kind of wit called *hoaxing*. Notwithstanding the marvellous features which were so manifest in the article, we had supposed that its being first published in a respectable newspaper, so near the alleged locality of the tree, was a sufficient guaranty that there was something of truth on which to be found the exaggerations of magnitude, &c. Therefore, like most other of our editorial brethren, we were so far deceived as to republish the article, without comment, (page 719 of vol. vi.)

When any journal has thus, unwittingly, aided to give currency to a lie, it is the duty of its conductor, to state the detection. But more especially is this incumbent on the first publisher—and if his exposure is not made (if in his power) of the *deceiver*, as well as of the *deception*, then he is equally guilty of the fraud on the public.—Ed. Far. Reg.

MANURING WITH ROTTEN LOGS AND BRUSH.

To the Editor of the Farmers' Register.

Clarksville, February 12th.

Upon the testimony of some of the most respectable and veritable gentleman of Halifax county, Virginia, I shall proceed to give you an account of the remarkable effects of a new and rare manure, as exhibited by an experiment in that county, a few years since. The manure above alluded to, is only rare as to the manner of its application, for in old Virginia it very much aboundeth. The experiment was as follows: A gentleman cut down the pine growth which had covered a piece of land, exhausted and turned out of cultivation by his father or grand-father. As is usual, he suffered the logs and brush to lie upon the land the first summer. In the fall and winter succeeding, he commenced his preparations for a crop of corn, by running two strokes with a large two-horse plough in the same furrow, one turning to the right, and one to the left. This trench thus made, was filled with the logs and brush of the pine trees next convenient to it, which cleared a place for the second furrow; and so on, until this log and brush material was all consumed. With this preparation he passed over half the land. The balance was simply flushed with the same two-horse plough, and well manured from the stable and farm-pen. The crop grown on the beds, manured in the hill with pine logs and brush, was not only the best corn of the two, but was unusually rich in its growth, and heavy in its production. The owner of the corn was induced, from its remarkably luxuriant appearance, to pull up one of the logs, during the growing of the crop, to see how it was that such vigor was imparted to it; he found the countless number of little thread-like roots, which mainly contribute to the supply of the vegetable, to have perforated the water-soaked and partly decayed trunks and limbs of the pine trees, buried below.

Here, Mr. Editor, is a fountain of manure, which, in its general diffusion through our state, and in its practical good effects, as demonstrated above, bids far to rival the boasted marl-beds of lower Virginia; and that which has been regarded as an indication of poverty and decay in our lands, may be made the instrument of their restoration and recovery.

Your obedient servant,

T. CARRINGTON.

ANSWER TO STRICTURES ON THE PROPAGATION OF SILK-WORMS.

To the Editor of the Farmers' Register.

I have read the strictures of Mr. Layton Y. Atkins, in the January No. of the Farmers' Register, (page 26,) on a paragraph in the second number of my essay on the culture of silk. I readily admit the uncourteousness of the language used by me in the paragraph he refers to, and I can only plead the haste in which that essay was composed, in extenuation. I had no time to revise the article; it was written "off-hand," and went beyond my control before an opportunity was afforded, by reflection, to correct the phraseology. But I cannot go any further than this. The "theory," (I presume he means *the practice*, as I did not give the theory,) I cannot admit to be either "erroneous" or "calculated to do harm." And from a remark in the latter part of his article, I suspect Mr. Atkins has altogether mistaken the meaning of the paragraph he criticizes; for he says, "The energy of the males is far from being exhausted when the females *are satisfied*, and if not taken away," &c. This remark leads me to suppose that Mr. Atkins would allow the moths to remain coupled until the females were "satisfied;" and if so, how does he ascertain that result, if not from the fact of the couple having voluntarily separated? The Chinese writings which Mr. A. quotes, say not a word about separating the *coupled* moths; it merely recommends, "as I understand it," that the males that have become *detached* from the females be removed. The quotation from D'Homergue's essay is entirely irrelevant; and even if ever so much to the point against me, would be no authority with me. My opinion of his essay has long been known, and I need scarcely now repeat it. I will only remark, in passing, that D'H. labored hard to prove that we could *never learn to reel silk without two years' instruction in his filature*, for establishing which, and teaching sixty young men to reel silk, he asked $60,000 of the government of the U. States. His essay is, in fact, nothing more than a compilation from French and Italian works. Will Mr. Atkins do me the favor to say whether he can follow D'H's. direction *to separate the male and female cocoons*, so that they shall be laid on separate tables, "the males on one table, and the females on another?" But I will now give the theory on which my practice is founded, and shall be much obliged if Mr. Atkins will point out wherein it is "erroneous and calculated to do harm."

The silk-worm moth lays from 350 to 400 eggs. Each egg is fecundated separately; consequently, if the moths are separated before they separate of themselves, more or less of the eggs will be unfecundated. There is no precise time required; from six to twelve hours is usually occupied; but I have often known them to remain coupled eighteen hours, and very seldom found them to separate voluntarily in six hours. I have separated them after being together one hour, and but about a dozen eggs were fecundated; those separated at the end of two hours I found laid only about fifty fecundated eggs; and so on in pretty regular proportion to the time occupied, were the eggs fecundated. Those that I separated at the end of six hours were generally about two-thirds fecundated, and very seldom more; while all that I left together till they separated of their own accord, were uniformly *all* fecundated!

Now, in the case of the silk-moths, the French direct that, after they have remained coupled six hours, they must be separated, by taking them by the wings, one between the thumb and finger of each hand, and pulling them apart, and taking the males away. I pray you, Mr. Editor, to look at this direction with a little of your usual common sense, and say whether I have been unpardonably "uncourteous" in calling this "foolery?" I leave out the national allusion in courtesy to Mr. Atkins. Is there any other instance in the breeding of animals in which this act is thus interfered with? Is there a single reason that can be given for such interference?

I do not object to removing the males from the females, after they have voluntarily separated; on the contrary, I have my fixtures so contrived, that the *released* males generally fall off upon the floor and are swept out of the room.

The "viscid humor," spoken of by D'Homergue, is nothing more than the remains of the contents of the *ovarium* after the eggs have been formed; it is often entirely absent, and I never knew it to do any other harm than to soil the papers on which the eggs were laid.

GIDEON B. SMITH.

[The views on both sides of this matter have now, we presume, been sufficiently expressed, and we beg leave to close the discussion. It would be a ridiculous degree of squeamishness to exclude such subjects from an agricultural journal, which must necessarily treat of many particulars of the generation and propagation, of domestic animals. But it is nevertheless desirable that the language used, on such anatomical and physiological branches of general agricultural science, shall be as much guarded in manner, and limited in extent, as utility may admit, and propriety require.—ED. F. R.

From the Southern Agriculturist.

LARGE AMOUNT OF SOAP PRODUCED FROM MYRTLE WAX.

Mr. Editor,—Many of your readers may not be aware of the great quantity of soap which can be produced from a small quantity of myrtle wax. I have repeatedly made the experiment in my own family; and in hopes of being useful, I send you the following account, taken many years since, and which has been found correct up to the present time.

To three bushels and a half of common wood ashes, was added half a bushel of unslacked lime. These being well mixed together, were put into a cask capable of containing sixty gallons, and was filled up with water. In forty-eight hours, the lye was strong enough to float an egg. It was then drawn off, and from six to eight gallons of it put into a copper kettle, capable of containing about twenty-five gallons. To this was added only *four pounds* of myrtle wax. This was kept boiling over a constant steady fire from 9 o'clock in the morning till 3 in the afternoon. For the first three or four hours, a supply of strong lye was poured in occasionally, and the whole frequently well stirred with a ladle. After six hours boiling, two quarts of common large grain salt were thrown into the kettle, which was left one hour more to simmer over a slow fire. The liquor was then put into tubs to cool, where it continued twenty-four hours; and then the soap was taken out, wiped clean, and put to dry. The next day it was weighed, when the produce was found to be *forty-nine pounds* of good solid soap, from the materials, and by the process above mentioned. At the end of six weeks, the soap had lost only a few pounds, from the evaporation of its watery particles.

In many parts of our state, the myrtle tree is abundant, and from three pecks to a bushel may be gathered from a hand per day. Would it not be worth the while of our planters to attend to this matter? I am sure it would save them many a dollar. Your obedient servant,

ECONOMY.

St. Paul's Parish.

From the Horticultural Journal.

EMASCULATION OF THE VINE, OR A METHOD TO PRODUCE GRAPES WITHOUT SEEDS.

Some of your readers will possibly feel startled at the above designation, and many will disapprove of a term used in surgery to an operation on the vine, at variance with received opinions on the physiology of plants. But to your more ingenious readers, the experiment will offer a new source of amusement, and perhaps may lead to useful investigation. In Portugal and other places, I frequently met with orange and lemon trees, which produced fruit divested of pips. Upon inquiring for the cause, no one was able to enlighten me, further than that the effect was accidental. And I make no doubt that mere accident, (such as the perforation of the plant, when young by a worm, or a blow from a spade or hoe, when first planted,) did produce the same effect on those trees which it would have produced upon the vine, if done purposely, and with a view of the same result.

For this ingenious operation on the vine, I was indebted, some years ago, to a horticulturist of great eminence in Paris. It is as follows:

When the sap is rising in March, make a deep incision in the heart of the bearing branch, from whence extract, with a grafting knife, about a quarter of an inch [1 centime, 5 lignes,] of the pith, [moelle,] close under the first bud [nœud,] at the stem, (souche.) The wound is then to be bound up with worsted, like a graft. This may be removed at the end of three weeks.

If the operation be performed with care, after some experience, the result will be the production of grapes without pips.

From the Horticultural Journal.

NEW METHOD OF APPYING SULPHUR TO PLANTS, IN A LIQUID FORM.

The "flowers," or the finely levigated stone brimstone, are with great difficulty mixed with water; and yet it is sometimes highly desirable to throw a shower of sulphuretted water over the entire foliage of a vine or peach tree. This object can be readily effected by the aid of a little gum tragacanth [gum-dragon, as it is vulgarly called.] Half an ounce of the *powdered* gum, which can be procured very cheaply of any druggist, may perhaps suffice for two or three years. To a table spoonful or two of flowers of sulphur, in a wedgewood mortar, add three or four grains [or a quantity that would scarcely cover one half of a four penny piece,] of the tragacanth; rub them together, dropping in a very little water; work these materials with the pestle till an even pasty mass be produced; then add water, to bring the sulphur to the consistency of cream; and in this state it will unite with any quantity of water; or, in other words, the particles of the sulphur will become diffused throughout the whole bulk, and can then be taken up by a syringe. The sulphur, it is true, will be deposited in time, but agitation will bring it again to that state of diffusion in which the particles may be thrown on the plant; to which, also, they remain *fixed* in situations wherein they may exert their utmost energy, whether that be preventive or remedial.

THE FORMER POOR AND EXHAUSTED CONDITION, AND EARLIEST SUBSEQUENT IMPROVEMENTS, BY MARLING, OF COGGIN'S POINT FARM.

(An omitted portion of the 'Essay on Calcareous Manures.')

[The following article was, as it purports, for the greater part, written in 1826, and was added to and completed in 1833. The object of it, at both times, was to be inserted in the 'Essay on Calcareous Manures,' to serve as appendix to the many particular experiments with marl, therein given. But the same considerations, as stated below, which prevented it's being included in the first edition, also operated to exclude it from the second. In now giving it publication, no change has now been made, except a few merely verbal corrections.]

Experiments on a small scale, made to test the value of manures, however numerous and varied they may be, or however carefully conducted and minutely reported, will never be so satisfactory to the reader, as knowing the general effects of the same practice when applied to the whole of the experimenter's land, and affecting the whole of his capital and labor. In limited experiments, the

operator may easily deceive others, if he chooses: and, even if actuated by the strictest regard for truth, the wish to obtain a particular result, will often cause him to deceive himself. But in the results of any general practice, continued for ten or twelve years on a well known farm, it is impossible that the cultivator can deceive either himself or his neighbors. For this reason, those who have read the statements of the experiments presented in this essay, may require to know what proportion the success of my subsequent and general practice bore to their results. The personal objections which caused me to exclude the following detailed answer to this requisition from the first publication of this essay, are not removed. But it has appeared that the omission has caused distant readers to place an estimate on the writer's merit and general success as a farmer, far above the truth—and many others may err as much by measuring the value of the system of improvement recommended, by the known and acknowledged faults of the writer's general management. Either of these inferences would be erroneous, and, in different ways, would operate to impair the value of the opinions and facts which have been presented to the reader. These considerations induce me now to submit the details which will follow, of matters which, in any other aspect, are of no importance to any but myself. The objectionable character of egotism is necessarily conspicuous in these details; but that fault cannot be possibly avoided in a work which is, in fact, but a statement of the opinions, experience, and personal labors of the writer.

Having kept written memoranda of my farming operations as long as they engaged my personal attention, I am enabled to present a table of crops, which shows the grain crops of Coggin's Point, from 1813 to this time, 1826,* with as much accuracy as can be expected under such circumstances. This would be the best of all modes of fixing the general effects of any system of improvement, if the fields, and the rotation, had remained without alteration. But, like most others in our country, my farm has been in a state of continual change in these respects, which prevents as accurate conclusions being drawn, as other circumstances would have allowed. From 1813 to 1826, the arable land (excluding all waste spaces, not cultivated,) has been increased from 472 acres, to 602, by clearing wood-land, and some draining. The rotation has been changed from 3 to 4 shifts, and still is not regular, as the poorest land is sometimes left out when it comes in turn for corn, (so as to have three years of rest, and bear only one crop of grain)—and the richest land is sometimes made to bear three, and, in some rare cases, even four grain crops in succession. Still, however, some of the facts are not affected by any such sources of error, and will serve to show the miserably low product of what was called, (in common parlance) "a good James River plantation;" and from which may be inferred something like the usual product, of the back lands generally, which were so much inferior to those on the river—and which still remain as poor as ever, where no marl has been used.

Of the 472 acres of arable land, about 100, on the river, consisted of *neutral soil*, including a much smaller proportion of what was *calcareous*. All this had been very much reduced below its great original fertility, by severe and careless tillage, and still more by the washing of rains. The produce of this once fine soil was still equal to 20 bushels of corn, (and in some cases 25 or more,) on the richest places, which were too level for the soil to be washed away by rains; and as low as 15 bushels or less, on a larger proportion. This kind of land, (though generally a light loam, and none of it clay,) formed the only good wheat soil on the farm. It did not form one body—but was cut up and separated into many pieces, by hill-sides, ravines, and strips of wood, marsh, or other waste or worthless land. The same objectionable surface and form belong to nearly all the old cleared land on the farm; a large proportion being hilly, and more or less injured by washing—and many deep natural ravines with wet bottoms, which were covered with trees, serving to kill the land all along their margins, to shelter vermin, and greatly to increase the labors of every year. Nearly 300 acres, which lay next to the neutral and calcareous soils, were of the land penetrated by these ravines; and all this was supposed to have been originally of that kind of soil called *free-light land*, though not as light, except a small portion, as the soils described in experiment 14 [pp. 46, 47, of 2nd ed. 'Essay on Calcareous Manures.'] The remaining 70 to 90 acres were outside of the heads of the ravines, and like the adjacent wood-land, must have been always unproductive, as well as *acid soils*. The greater part of the land added by clearing afterwards was of the same bad character; and not so much as 20 acres of new land was of durable fertility. Nearly all the inferior qualities of soil were *acid sandy loam*—though a small proportion was of *acid clay*.

This general description of soils, and their situation, if considered in connexion with my doctrines as to the action of calcareous manures, are enough to prove that the farm was not favorably constituted to be highly benefited by those manures. Their greatest effects have always been on the most acid soil. The great body of the old cleared land, showed less benefit, even where level, and still less in proportion as its natural soil had been lost by washing. As to the spots so much washed as to be barren "galls," the worst of them still remain in that state, and never can be made productive, except at a cost exceeding their value after being improved. The neutral soil has been still less improved by marling. In addition, the excessively heavy applications of marl on more than 150 acres, caused the benefit of that manure to be almost lost for some years, and the whole damage has not yet been overcome.

The crops of corn have not been actually measured by the barrel, except in those cases marked [thus *] in the table. In the other cases, estimates of quantity were made by the cubic contents of the houses filled with corn, or by the number and average size of the cart-loads brought from the field. After the first five corn crops, neither their amount, nor average to the acre, indicates the rate of improvement, for several reasons: the usual extent of cultivation was much lessened for some years, to furnish labor for marling, and at other times on account of the low price of corn,

* The time when this was written. I have thought it best not to change its form, but to add the observations afterwards, that my experience has furnished, from 1826 to this time, 1834.

(sometimes it being less than 40 cents the bushel,) and there being on hand a large supply. The parts thus left out were generally the poorest of the field, which had the effect of raising the apparent average product. From 1818 to 1823, inclusive, the crops of corn were also considerably increased by the annual cultivation of part or all of 30 acres of embanked tide-marsh, which has since sunk so low as to be unfit for grain, or even grass. But the average product of wheat is a much better measure of the rate of improvement of the farm: for though the sandy nature of most of the soil was very unfavorable to the growth of wheat—yet having a ready market, and the delivery at my landing, and being able to deliver it very early, it was deemed the most profitable crop, and as much was raised every year as the system of cultivation and extent of land permitted. The whole crop was always delivered to the buyer within the space of two or three days, which leaves very little ground for error in quantities. My fields have been carefully surveyed, and the only mis-statement, on that score, that the following table can present, will arise from my having to guess at the sizes and amount of the pieces of waste land included in the fields, but deducted in the statement of acres cultivated.

TABLE OF GRAIN CROPS.

Year.	Acres in wheat.	Product in bushels.	Average per acre.	Average crop.	Average per acre.	Acres in corn.	Product in bushels.	Average per acre.	Acres in cotton.	Acres marled.	Remarks.
1813	145	810	$5\frac{35}{145}$			125	2250*	18			* Measured.
1814	110	550	5	627	$5\frac{2}{3}$	163	1340*	$8\frac{36}{183}$			
1815	78	520	$6\frac{52}{78}$			136	1955*	$14\frac{51}{137}$			
1816	104	896	$8\frac{64}{104}$			144	2300*	16			
1817	79	595	$7\frac{43}{79}$	647	$7\frac{11}{12}$	188	2050*	$10\frac{170}{188}$			
1818	63	450	$7\frac{93}{63}$			160	2670	$16\frac{110}{160}$		15	First commencement of marling.
1819	132	1015	$7\frac{91}{132}$			137	2000	$14\frac{82}{137}$		62	Very thin marling as yet.
1820	119	1020	$8\frac{68}{119}$	1028	$7\frac{1}{2}$	164	2780	17		25	
1821	160	1049	$6\frac{89}{160}$			77	1775*	23		80	
1822	154	1627	$10\frac{87}{154}$			114	2250	$19\frac{84}{114}$		93	
1823	139	1475	$10\frac{85}{139}$	1651	$10\frac{1}{6}$	158	3000	19		100	
1824	194	1850	$9\frac{104}{194}$			156	3405	$21\frac{4}{5}$		80	Marling nearly extended over all the cleared arable land requiring it.
1825	195	1452	$7\frac{87}{195}$			70	1254*	$17\frac{64}{70}$	48	50	
1826	170	1390	$8\frac{3}{17}$	1403	$8\frac{1}{6}$	138	2275	$16\frac{67}{138}$	70	24	
1827	151	1366	$9\frac{7}{151}$			104	1665	16	$76\frac{1}{2}$	27	

Imperfect as this table is, for the various reasons before stated, it furnishes information in some cases so exact, that they deserve to be considered as accurate experiments on a whole field, or the entire farm. The most important of these cases will be referred to, and accompanied with such explanations as are necessary.

The first three crops of corn covered all the land then cleared, except 48 acres, which could not have yielded more than 10 bushels per acre. That supposed product being added to the actual product of all the balance, (forming the crops of 1813, 14, and 15,) shows the average of the whole cultivated land (excluding all waste spaces,) to have been $12\frac{3}{4}$ bushels the acre. From such an average on land of very unequal qualities, there can be no doubt but that the poorer half of the farm did not yield on the average 8 bushels of corn. During the first 6 years, but little of this poorer half was sown in wheat, as it would not have yielded more than 2 or $2\frac{1}{2}$ bushels: Therefore, the first two general averages of $5\frac{2}{3}$ and $7\frac{11}{12}$ bushels of wheat, were obtained from the richest parts (say three-fifths) of the land; and if all had been included, a much lower general average would have been made—probably not 4 bushels. The increase of general average product of wheat, per acre, in the second of these two terms of three years, was not owing to any appreciable increase of fertility, but to the circumstance that much less land was sown, and the parts left out, of course, were the poorest. The wheat crops of 1819 and the next two years were increased in amount by a summer fallow of some of the poor lands before left out—besides the improvement which had then been gained from the earliest marlings. Since then, all the poorest land has been marled, and *the whole* is regularly sown in wheat in its turn; and yet the average of the years 1822, '23, '24, rose to $10\frac{1}{2}$ bushels. Afterwards the crops, as well as the average products were reduced—but it was owing to various disasters which greatly injured all the crops of our part of the country. In 1825 very few persons made half a crop; and still less of perfect grain.

No grazing had been permitted on the poor land, and but little on the rich, since 1814—and during the first 6 years, before marling was begun, I was more attentive to making and applying farm-yard and stable manures, than for the 6 or 7 years after. The table shows that these means produced very little, if any, general increase of

crops—and that nearly all the improvement actually gained was apparent *as soon as marled land only was sown in wheat.* As each field came under its second rotation, there was always more or less of loss sustained from the disease caused by my improper heavy dressings.

One circumstance should be stated, as it served to make the apparent average increase of crops greater than the truth—and another, that served to lessen it. In 1824, '25, and '26, a field of 70 acres of the best soil was one half in wheat on fallow every year—which gave a crop from 35 acres each year, instead of from only half that amount, which would have been from the regular four-shift rotation. The other circumstance was the clearing and bringing into cultivation more than 100 acres of land, which, before marling, would certainly not have averaged 6 bushels of wheat to the acre; and of course this served to lessen apparently the general average, after it was raised to 10 bushels. The reclaimed marsh, before referred to, never bore wheat, and therefore has not affected these estimates.

The product of one poor field of 135 arable acres happened to be measured and set down separately, for two crops of corn, before marling. In 1814, it brought 1125 bushels, or 8⅓ to the acre. In 1817, with the advantage of a good season, it brought 1235 bushels, or 9 and a small fraction to the acre. In 1825 my whole crop was on 70 acres of this field, (supposed to be a fair average of the whole,) and the first cultivation after its being marled. The produce was 1254 bushels, very nearly 18 bushels the acre. Some farm-yard manure had been given to this crop—and rather more to each of the two former. But no manure put on that land, before marling, had shown any effect longer than a single course of crops, if so long.

Since this table was prepared, and the foregoing estimates and observations written, (to 1826,) 8 more crops have been made. Not having paid the same personal attention to my business for the greater part of this time, nor continued to make written memoranda of the operations of the farm, I cannot extend the table of crops accurately to this time, and can only state general and important results.

The wheat crops of 1827, 28, 29, as well as the two last preceding those years, were all very bad, and generally on account of *rust*, which seemed to have become so regular and destructive in its visitations, that I began to think that a change of climate had taken place, which required that wheat should be abandoned as a crop in lower Virginia. Most persons, on poor land, between James River and Carolina, gave up the crop entirely. My own sowing was on this account reduced in extent by 30 or 40 acres a year, of the richest land, which was given up to the then newly adopted crop of cotton. This crop was commenced on 48 acres in 1825, increased to 96 by 1829, was reduced greatly in extent in 1830, and then abandoned *for ever*. My crops of cotton were very good, and peculiar benefits were obtained from the powers of marl in warming the soil, and hastening the maturing of the crop. But my best land, wherever it might lie, was taken for cotton—and all my farm-yard and stable manure was given to it. The land being kept year after year in that crop, and under the most perfect and incessant tillage, was caused to be washed most destructively by every heavy rain; so that, with washing and exhaustion together, all the manure did not prevent the best land being actually reduced in productiveness in these five years. This culture had also cut up and almost destroyed the best fields for other crops; and not only took their best portions for cotton, but also robbed the other and poorer parts of all share of the manure. It is therefore not to be wondered at, that the wheat crops should have been much diminished, even without the aid of so many successive bad seasons. In 1831, the crop of wheat generally was remarkably good; and of mine, 2401 bushels were measured, and fully one hundred more had been lost by sprouting in the field during the longest spell of wet weather, about the close of harvest, ever before known at that time of year. In 1835, the crop of corn, on one of the four regular shifts, amounted to more than 4000 bushels. At this time, (1834) the arable land has been increased to about 770 acres, by new clearings of wood-land, all of which was of acid poor soil, the first cultivation of which, even after marling, served to reduce the previous general average product of wheat. Clover, which the cotton-culture excluded from the best soil, has since been sown over nearly the whole farm, and grows on every field, with more or less vigor, according to the condition of the land. This has been partially grazed, and the best parts mowed for the last few years. Farm-yard and other putrescent manures, which were almost entirely neglected while the marling was most on hand, have since been collected and applied much more abundantly, than at any former time, though still less so than ought to be done. With the operation of all these circumstances, there were others which served to have counteracting effects. The withdrawal of my personal attention from my farm, (owing, at first, to long-continued ill health,) the removal to another place of residence—and the change of pursuits, and of habits growing out of these and other circumstances—all concurred to change a general system of farm-management, which had been always imperfect, slovenly, and wasteful, to what was much worse in every respect. It is, therefore, not strange, that improvement has not kept on with the rapidity with which it formerly advanced, notwithstanding the many causes which operated even then, to retard its progress. Whatever I have been enabled to perform by the only means for improvement, in which zeal and the deep interest felt, made me highly successful, may be done much better, and with much greater profit, by the many who are better economists and better operatives; or by many others, who, though perhaps exercising no more skill and economy, have greater facilities for applying calcareous manures, and soils more favorable to receive such improvement. It is believed that the present average product (1834) of the arable land of the Coggins' Point farm, (excluding all waste spots) in corn, would be from 20 to 25 bushels to the acre, in average seasons, and with good cultivation—and in wheat after corn, 9 to 10 bushels. Wheat on clover, of course would be far more productive, but to what extent, I will not presume to offer an estimate, as this system is but now commencing as a part of the general rotation.

POSTSCRIPT.

Petersburg, February, 1839.

It would probably appear a strange omission if nothing were added to the foregoing statement, of the four years which have since passed. It is, therefore, that a few general remarks will be offered. Long before the date of the last additions, (1834) the writer had not only changed his residence, but had undertaken other pursuits which have since become more and more engrossing in the demand on his time and labor, and have prevented all personal attention to his farming business. Added to this, the laboring force on the land was, at first, inadequate to keep it in proper state, either of tillage or of continued improvement; and the annual increase of fertility since, has served to increase the need for labor, and the losses incurred by the deficient labor and other farm capital not being supplied. Thus, while the progressive improvement of the soil and the increased ability to reward proper exertions, are abundantly manifest, the farm, in every other respect, was suffered to get wretchedly out of order; and now requires much labor and expense to be put in good condition. The requisite labor has just now been furnished, and other remedies afforded; and it is hoped, that within a few years time, the great and valuable improvement made here by marl, will no longer be partially obscured, or the full effect of it be rendered the least doubtful, by the mismanagement of the farm, or neglect of its owner.

ED. RUFFIN.

From the Cultivator.

ROOT CULTURE.

Persuaded that root culture is ultimately to effect a great improvement in our husbandry, we propose to make it the subject of some remarks in this and subsequent numbers. The advantages which root crops offer to the farmer, are the following, viz: they furnish the most food for animals, and the most food for vegetables in the form of dung; they are least exhausting to the soil, which they serve to divide and pulverize; they are excellent to alternate with grass and grain in convertible husbandry; and for these reasons they are the most profitable to the cultivator, on all farms which will admit of their culture. We intend to direct the attention of the reader to the different roots which are adapted to our field culture, to the best modes of managing the crops, the manner of preserving and feeding them properly, the expense of culture, the average product, and, so far as our data will justify, state their relative value as cattle food.

The roots we intend to notice are, the potato, the turnip, the beet, the carrot, and the parsnip. But before we proceed to consider them individually, we will offer some preliminary remarks.

Five things are essential in the culture of the roots we have named: 1st. A dry soil; 2d. a rich soil; 3d. a deep worked soil; 4th. a well pulverized soil, and 5th. good after-culture. The crop will be abundant in proportion as these several requisites are present, and defective in proportion as they fail.

By a *dry* soil, we mean a soil that is not wet. *Moisture* is beneficial to all crops, but *water* is detrimental to all root-crops, though it repose upon the sub-soil, or but occasionally saturate the surface. Hence where roots are grown upon soils that are tenacious and flat, or upon those which repose upon an impervious sub-soil, the land should be thrown into ridges, and the furrows kept open for the free passage of the water in heavy rains.

A rich soil is as essential to good crops as rich and abundant food is to the fattening of farm stock. We all know that short pasture and coarse fodder will *keep* cattle, though it will not *fatten* them. So with roots—they will *live* and *grow* upon a poor soil, but their product and profit will be great only on a *rich* one. The advantage to the crop, as well as the animal, will be in proportion to the quantity of dead organic matter which it converts into living organic matter—into vegetable and into meat. Ordinarily speaking, a good dressing of manure will double the products of a root-crop. To illustrate this fact more fully, we abstract the following tabular statement from Arthur Young's experiments in planting potatoes. The preparation and culture were alike in all. The numbers to which the asterisk [*] is affixed were manured crops.

No.	Preceding crops.	Expense £ s. d.	Product, bushels.	Profit. £ s. d.	Loss. s. d.
1	Fallow,..	3 19 1	104 at 1s. 6d	2 18 5	0 0
2	Barley,...	4 5 9	128 2 0	3 11 10	0 0
3	Wheat,..	6 13 6	46 0 20	0 0 0	0 0
4*	Do....	7 16 10	101 0 20	2 5 6	0 0
5	Do....	6 2 6	39 0 20	0 7 6	0 0
6	Do....	7 19 4	63 0 20	0 16 11	0 0
7*	Do...	4 14 5	170 0 20	9 2 0	0 0
8	Do....	8 9 3	30 0 20	0 0 0	15 6
9*	Do....	4 12 1	201 0 20	11 2 9	0 0

The three manured crops, it will be seen, gave an aggregate product of 472 bushels, and an aggregate net profit of £22. 10. 3, [$99 90, say $100;] the three adjoining plants, treated like the others in all respects but manuring, gave an aggregate net product of but 132 bushels, and an aggregate net profit of but 8s. 11d. [$1 96, say $2;] thus showing that the manure, in these cases, caused an absolute gain of $98, and that where it was not used, there was in fact only a nominal profit of *two dollars*. These facts will serve to show the reader, *first*, the great value of manure in farming operations, and to stimulate him to save and economise it; and, *secondly*, to show him the propriety of *always* manuring his potato crop, for which it is universally admitted the unfermented dung and litter of his cattle yard is *best* fitted.

A deep worked soil is necessary, that the tap roots of the beet, carrot and parsnip may not only penetrate freely, and enlarge their length and volume, but that their radicles, which are principally upon their lower extremities, may there find food for the plant. The fibrous roots of the potato and the turnip are equally benefitted by a deep tilth, from which they can draw nourishment, and find shelter from drought.

The pulverization of the soil is essential to the germination of the seed, to the easy extension of the roots, and to the free circulation of air and moisture, and the admission of solar heat, all necessary to prepare and transmit the food to the growing plants.

Thinning the plants and keeping them free from weeds, and the surface of the soil open to atmospheric influence, is of great importance. If the soil is dry, and rich, and deep, and well pulverized, the labors of the husbandman will yet not avail much, in root crops, if he suffers his plants to be injudiciously crowded, or to be choked and robbed of their food by rank growing weeds. And as prevention is better than cure, the thinning and cleaning processes should be commenced early, and rigidly persevered in, not only that the weeds may not exhaust the fertility of the soil, but that the latter growth may not mature their seed, and thus perpetuate the evil.

In our next number, we shall treat of the culture, &c. of the root crops named in the commencement of this article.

From the Cultivator.

EXPERIMENT IN PLANTING CORN—ALTERNATION OF CROPS—MODE OF APPLYING GYPSUM—OF FATTENING HOGS.

Rockingham county, Va. Dec. 25, 1838.

SIR—A friend of mine, last spring, planted a part of his corn at the depth that corn is usually planted in this part of the country, and in another part of his field, he ran his planting furrows unusually deep. The land was of uniform quality, and the corn in both parts covered with the common quantity of earth, so that the only difference in planting, consisted in the different depths of the planting furrows. In the early part of the summer, the corn planted in the shallow furrows, grew the best, and promised to make the best crop, but in the latter part of the summer, the season became dry, [the drought was severe,] and then the shallow planted corn began to wither, whilst the deep planted corn kept green, and continued to grow after the other was almost killed by drought, and made in the end greatly more corn. These facts have brought to my attention the question, whether corn should be planted deep or shallow? And by the question, let it be understood, that it is not a question about the depth of earth with which corn shall be covered; but a question about the depth of the furrow. And to this question, I would invite the attention of agriculturists, and request the communication of facts from all who have had any experience in the two modes of planting; as it is by a comparison of many facts only, that we can come to any safe conclusion in agricultural affairs. I have understood, that it is settled, that in the sandy lands and warm climate of South Carolina, deep planting is best. And if it shall be found that in our more northern climates and clayey soils, deep planting will yield the best crop, there is another advantage attending it, that will recommend it to those who cultivate this valuable grain. Corn that is planted deep is not so easily blown down by winds, and will not be bent and tangled at cutting time, like that which is planted on the surface. As this is a question involving no depth of reasoning or scientific knowledge, it may perhaps be passed over, with less attention than it deserves. But if it be duly considered, it will be found to be a question of interest, and it is hoped that all who can communicate facts will contribute their aid to a correct settlement of the question. In the case mentioned above, the corn was planted in a sandy soil, of but moderate fertility, and it will occur to all that in experiments which may be detailed, the character of the soil should be given.

Another question of interest to myself, is now forcing itself upon my attention; and I would be glad to hear the opinions of those, whose experience may enable them to speak upon the subject. To state the question more clearly, I will premise that for near twenty years, I have been cultivating a small farm upon the four-field system. When it first came to my hands, a part of it, though originally fertile, had been greatly exhausted by bad management, and all my efforts were directed to its improvement. My crops have been corn, wheat, clover; and by a free use of plaster and some degree of economy in saving manure, my farm is now greatly improved and may be said to be in good heart. The soil is a tolerably stiff clay, based upon what we call blue slate, the rock lying at a good depth below the surface. I have preferred mowing to grazing, and as the hoof is injurious to clay lands, the stock have been kept off the fields as much as possible, when the ground was soft. But little has been sold off the farm except wheat, clover seed, cattle and hogs.

Having but a small farm, and being desirous of cultivating more land than my farm will allow, upon the four-field system, I am inclined to divide my land into three shifts, and this forces upon my attention the question, whether I can preserve the degree of fertility which my land has attained, by cultivating corn, wheat, and clover, and letting the clover stand but one year, instead of two. By letting the clover stand two years, the land has improved; and now if it shall stand but one, will the land deteriorate, and will the crop be reduced? Let it be supposed that the corn shall be fed upon the farm; that the clover shall be in part mown, and in part grazed by hogs; and that a reasonable degree of economy shall be used in saving manure.

As he who asks information from others, should be willing to communicate any which he may have, and thereby show his readiness to contribute to the common fund, I will mention, that my practice, has been to sow plaster broad-cast upon corn, instead of putting it on the hill, believing, that at caring time, which is the most important, the roots have spread over the whole surface, and that the plaster being sown broad-cast, will then be in a situation to contribute more to the growth of the corn, than it would be if placed immediately at the stock, as it is the ends of the roots that take up nourishment: and believing, too, that when sown in this way, the plaster will benefit the succeeding wheat crop, and the young clover which shall be growing with the wheat. I have indeed thought, that sometimes the young clover is thereby saved from being killed by drought.

For some years past, my attention has been turned to hogs, and having been successful in my efforts, I will give you my opinions upon that subject. The more common practice with us, is to let our hogs shift for themselves, or to feed them but sparingly the greater part of the year, and then during the fattening season to feed them to excess. We then attempt to do that by force,

which might previously have been accomplished by an easier and cheaper process. By feeding too sparingly during the winter, the hogs are kept alive only; they do not grow; become stinted, are worth no more in the spring than they were in the fall, frequently not so much, and of course what has been fed has been wasted; and then, during fattening season, they are fed to excess, and loss is sustained by undigested corn. My plan has been to feed well, to start my pigs fat, and to keep them in uniformly good condition. They are always growing and increasing in value; are fed with a small quantity of grain when running in clover pasture, and by cutting up corn for them as soon as it is in good roasting ears, they are ready for market, as soon as the weather is cold enough for slaughtering. They are, in this way, fattened during moderate weather, and all agree that hogs fatten faster in moderate than in cold weather. I prefer fattening in a field, to a close pen, and from my observation, I am satisfied the field is the best. The field is used that is intended for the corn the following year. The grass and clover roots which they get, contribute to their health, and save corn, as any one may be convinced, by observing that they will feed a part of the day on the clover, however plentifully they may be fed with corn. If hogs be well fed, and kept *dry*, and *clean*, and *warm* in winter, and be furnished with shade and plenty of water in summer, they will, I think, be always profitable. A good breed should be selected, as some breeds are certainly more profitable than others. The feeding of hogs presents another question of interest, and we ought to inquire, whether clover grazed by hogs, will improve the land as much as if it be grazed by cattle; and whether the corn fed to hogs upon a field will improve it as much as if it were fed to cattle. These are questions which I would not undertake to decide from my experience, and upon which I would like to hear the opinions of others. If these inquiries shall receive any attention from the correspondents and readers of the Cultivator, I may be encouraged to trespass again upon your attention. GEORGE H. CHRISMAN.

From the (London) Farmers' Magazine.

ESSAY UPON THE BREEDING OF LIVE STOCK, AND ON THE COMPARATIVE INFLUENCE OF THE MALE AND FEMALE PARENTS IN IMPRESSING THE OFFSPRING.

By John Boswell, Esq. of Balmuto and Kingcausie.

[In the year 1825, the Highland Society proposed as the subject of prize essays, the solution of the question, "Whether the breed of live stock connected with agriculture be susceptible of the greatest improvement, from the qualities conspicuous in the male, or from those conspicuous in the female parent?" Four essays were received, to which premiums were awarded. Those that were written by J. Boswell, esq. of Balmuto, and by the late Rev. Mr. Berry, were considered the best. As many persons may not have seen these essays, which contain information valuable to all those who study the principles of breeding, we have given the essay by Mr. Boswell, which will be found interesting to every one concerned in the breeding of stock.]

> Te quoque, magna Pales, et te memorande canemus
> Pastor ab Amphryso.—VIRGIL.

The very great utility of a clear knowledge as to the best method of improving the breed of live stock, connected with agriculture, must be apparent to all; and as one heartily devoted to agriculture in all its branches, I cannot help congratulating the farmer on the information he is likely to receive on so important a subject through the endeavors of the Highland Society. As this subject has long [I may say from my earliest youth] been one in which I have taken the greatest delight, and on which I have bestowed much thought, besides having had very great opportunities of seeing experimentally the changes produced on stock from crossing, and other circumstances, I trust I may be justified from any charge of self-assurance, in offering a few facts in as short and succinct a manner as the nature of the subject and my own experience as an author, will permit, being well aware that facility of communicating knowledge is almost as necessary as experience in order to shine as an essayest.

Hoping, then, for candor in weighing the various facts I shall bring forward, and deprecating criticism as to the manner in which they are brought together (being a mere farmer, and no author,) I shall lay before the society such as occur to my recollection.

The society has put the question, "Whether the breed of live stock, connected with agriculture, be susceptible of the greatest improvement from the qualities conspicuous in the male, or those conspicuous in the female parent?"

The first thing to be done is to answer the query put by the society, and, having done so, to prove by facts that the answer given is the proper one. I have not the slightest doubt in my own mind that the answer ought to be "the male."* But before proceeding to prove this, I would warn all who may turn their thoughts to the subject, that it must be an enlarged view of this or any other matter connected with nature, which alone can give a true knowledge as to the point at issue. The fable of the fly on the building ought never to be forgetten; and the stock of a country or a district can only lead to the true result as to any particular breed. I would also remark, that, before the breed of a country can be improved, much more must be looked to than the answer to the question put by the Highland Society, such as crossing, selection of both parents, attention to pedigree, and lastly, food and care of the offspring.

I shall endeavor to explain my ideas on these heads; and then, having given some proofs as to the male being the parent having the greatest influence on the progeny, I shall endeavor to prove, that, whether I be right or wrong, still the male is

* It often happens that an author who has distinctly espoused one side in a question so difficult as this, feels disposed, after the lapse of two or three years, to modify, or even alter, his opinions; but it is consistent with our knowledge, that the accurate observations and farther experience of two years have only strengthened the author of this essay in the assertions which it contains.—ED. FAR. MAG.

the parent which we must look to, as best calculated to improve the breed of any country.

The art of improving the breeds of different animals was almost, if not altogether, unknown to the ancients. Virgil, who seems to have paid some attention to it, has stated things which experience has since taught us are erroneous. In this part of the island it has yet to be introduced, and we are forced to go to England for authorities on the subject. A few of our countrymen have indeed, of late years, come fourth, as it were —and in this number we must rank Mr. Stirling of Keir, Mr. Robinson of Ladykirk, and Mr. Rennie, jr. of Phantassie, who having seen the value of improved stock, and of attending to pedigree, or breeding from parents, "*de bonne race*," as the French well express it: but with the exception of these, and some few others, we are yet miserably behind. The very term "a great breeder," signifies two totally different things in England and Scotland: in the former, it means a judge, and one who delights in improved breeds; in the latter, a person who has a great number of (commonly speaking) half-starved calves or miserable lambs, and in whose stock we may see every variety of shape and color. We have only to look to any drove of Scotch beasts on the road, to satisfy ourselves of the want of all care in our breeders. The cattle are of all different shapes, some with horns, and some without; and if you inquire of the owner, you will find that he purchased some of those dissimilar beasts, not from different breeders, not in different districts, but from the *same farmer*—and his own cattle in one fair. How and why is this? Because our Scotch farmer is ignorant of his own trade! They all know and admit, that "breeding-in-and-in," or "oure sib,"* as they call it, is bad; they know the value of crossing, and they wish to cross, and do so; but it is without judgment. A farmer no sooner hears that his neighbor has got a good bull, most likely from a distance, than he says, "I must have a breed of him," as he calls the first offspring between his own cow and this bull; and the cow is put to this animal, although the one should be Galloway, and the other a short-horn: thus his calves are so unlike, that, when his stock is carried to market, they present that tag-rag appearance which I have mentioned before, and which the best dealers are now rectifying to themselves for their own profit, by carefully classing them into horned or polled, &c. and thereby raising the value of the *self-same animal* from 10*s*. to 20*s*. a-head in the markets of the south, by giving them that uniformity which the breeder ought to have done.

When I would praise the advantage of crossing, I would have it then to be clearly understood, that it is only to bring together animals, *not nearly related*, but always of the same breed, never attempting to breed from a race-horse and a cart-mare, or *vice versa*. Such a thing may do well enough for once to get an insulated animal, but will end in vexation, if attempted to be prolonged into a line.

We know that crossing, even however ill-done, is productive of good. It uniformly frees an animal from many of the weaknesses and maladies to which those bred *in-and-in* are subject, and almost invariably procures a much larger animal than either of the parents. That enlightened gentlemen and accurate observer of everything connected with animals, Sir John Sebright, whom I shall frequently have occasion to quote, says, "I have tried many experiments by breeding in-and-in upon dogs, fowls, and pigeons; the dogs become, from strong spaniels, weak and diminutive lap-dogs; the fowls become long in the legs, small in the body, and bad breeders."

Mr. Bakewell, that illustrious breeder, denied this; and was the first, I believe, who said that a cross was unnecessary, that animals would not degenerate by being bred in-and-in, &c. but let us look to the result. His admirable breed of sheep are fast going to decay; they have even now become small, and are, to a great degree, what is termed soft sheep, *i. e.* liable to many complaints. The malady to which sheep are most subject, decay of the liver, attacks them very frequently, and altogether, they make good the old adage, of soon ripe soon rotten; more quickly coming to maturity than any animal we know, and as speedily going to decay. I have seen the wonderful effects produced by crossing, in renovating this breed, having, for several years, been in the habit of buying in a couple of scores of Highland ewes, and putting them to a pure Bakewell ram. They were always poor small things, worth not more than from 3*s*. or 3*s*. 6*d*. to 6*s*. each; yet these ewes produced lambs which astonished every one who saw them, and which sold to the butcher at 10*s*. 6*d*. a-head. As to the appearance of those lambs I shall have occasion to speak in another place. Did the limits of an essay permit, I could bring many more instances to prove this, my first position, that it is absolutely necessary to shun breeding in-and-in; but, as I must hasten to the main question, I shall only remark, that the benefit of crossing extends even to the vegetable creation, a fact which is now pretty well known, and may easily be proved in the cultivation of various plants. In none is it more conspicuous than in the turnip. It is now some years since it occurred to Mr. Gordon, farmer, at Orrock, near Aberdeen, that, as the brassica tribe easily breed together, as it were, it might be possible to cross the ruta baga with some of the other sorts. He did so, and found that the crosses which he had got were far superior in size to either of the sorts he put together, and also very hardy as to standing frost. I know another small farmer, who, after a very severe winter, tried putting red-top and Norfolk white turnips together, which are both very easily destroyed by frosts. From these he procured a cross which stood the frost uncommonly well, and grew to a large size on poor soil. But to proceed to selection.

In this term I would include, not only the choice of two well-made parents, but the guarding carefully that the same defects, however slight, did not occur in both; for it is a fact, stated by Sir John Sebright, and which has uniformly been proved by my own experience, that it is not always by putting the best male to the best female that the best produce will be obtained; for should they both have a *tendency* to the same defect, although, in ever so slight a degree, it will, in general, preponderate so much in the produce as to render it of little value.

* Nearly related.

I found the truth of this in a very striking instance about ten years ago. Having a cart-mare of a very superior description [and which has twice gained premiums at agricultural shows] I looked out for a first-rate stallion, intending to breed from her. At that time a horse, belonging to Mr. Buchan, near Crief, called Blaize, was carrying all before him.* I thought I could not do better than breed from this horse, not taking into consideration that both sire and dam were of the same make, viz: rather long in the leg; the consequence was, that I had a very fine foal to be sure, but with longer legs than either of the parents. The next time I had learned to correct my former error, and bred from a short-legged horse from Cheshire, which was a great cross to my Scotch mare, and also differed from her in shape. The effect was immediately visible. I had a mare which it would be difficult to produce an equal to, the leg not being so short as the father's, although the whole appearance much resembled him, nor quite so long as that of the dam. Another very striking instance of this came under my notice a few years ago. A friend of mine [General Burnett] had a mare what is called three parts bred, certainly a very fine mare to breed from, but a very tall mare, with long legs, which was put to the longest legged thorough-bred horse I ever saw. (Bethlem Gabor, the property of Lord Aboyne.) The produce quite resembled the sire, and, at two years old, had reached the height of seventeen hands; but he was a monster, all legs, and very soon proved this by knuckling over at the pastern joint, till at last he could not walk; and at three years old was shot. The same mare was next covered by Hospitality, a horse as remarkable for being short in the leg, and what is termed short-jointed. The produce was now a low sturdy animal, greatly resembling the sire, and short in the leg;† thus in both instances proving, not only what I mention to be requisite, viz: judicious selection of the two parents in reference to the make of each, but also the great power of the male to change the whole shape and appearance of the produce.

I proceed next to mention the necessity of attending to *pedigree.*

If we look, with an attentive eye, to nature and to her productions, we shall see that they are not only beautiful, but that all she does is uniform. Thus every wild animal is of the same color, and nearly of the same shape; every flower resembles another; but man must always be assisting nature, as he terms it. Then we see flowers grow many colored, or perhaps double; beasts and birds change their shape, color and nature, so that we see such varieties as were altogether unlooked for.

The only way we can guard against this, is to know well what the *ancestors* of the animals we breed from were. Without this, our produce will every now and then be breaking through the general rules, and annoying us with odd-looking animals, deriving their shape from some of their ancestors, perhaps, two of three generations back.

Few words will suffice as to food, and care of the offspring. Nothing can be more absurd than to suppose that animals can improve if neglected in their youth.

We have the strongest proof of this in the starved animals brought from the West Highlands, which crowd our fairs, particularly those of Falkirk and Hallow Fair of Edinburgh. Let a farmer buy some of those when "year olds," and place them [ere they be at the age of maturity] in a more genial climate, and on good keep. See what beautiful cattle they become. Let him buy two-year olds, and the improvement will be less—at three, and they will only lay on fat, without reaching large size. On the other hand, let him purchase half a dozen starved looking small cows, from the same part of the country, in calf [provided they shall be of the pure breed;] let him take those cows home, and suffer the produce to suckle the dam while she feeds in good pasture. In winter, let them be well fed, and lie in a shed or house tolerably warm. What sort of beast has he now? Let the reader call to mind the West Highlanders shown at Queensbury House for the two last years, every one of which weighed from 70 to 80 stone, and the question is answered. I was once taken to see the cattle of the late General Simpson, who had the purest short-horn blood, a breed which, without all doubt, are capable of being made the fattest. These cattle were in such a state as I have never seen any other animals. They were all bone and skin, their eyes looked unhealthy; and altogether, from starvation, and I rather think from want of crossing, they appeared like so many invalids in the last stage of consumption. To improve any breed, or keep it up when improved, stock must be well fed from the time they are produced. "Sir," said a great breeder to me once, "to produce a fine animal, you must feed him from the starting-post." Warmth, that is a temperate climate, appears to be perfectly necessary to the improvement of all animals, and particularly so *in live stock connected with agriculture;* for, if we look at these animals, or even the human species, whether in the frigid or in the torrid zone, we find them dwindling into Liliputian size.

I come now to the grand point; to prove which, I conceive it will be necessary to fix upon some marks whereby a change, and that change an improvement, may be traced. The one, which in

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* This horse generaly cleared £150 per annum to his owner, gaining every prize at all the agricultural shows for many years; frequently being selected as the best, when 25 to 30 of the finest stallions from Clydesdale and Fife were shown in the same field; and was, without all doubt, a most superb horse.

† In the Philosophical Transactions for 1809, in a paper by Mr. Knight, on the same subject as this essay, the author, in contending for the impropriety of propagating from large in preference to small females, brings forward a very interesting remark upon length of leg in the offspring. "Nature," says he, "has given to the offspring of many animals (those of the sheep, the cow, and the mare, afford familiar examples) the power, at an early age to accompany their parents in flight; and legs of such animals are nearly of the same length at the birth as when they have attained their perfect growth." The natural result from which would be, that the offspring should resemble their mother in length of leg, and consequently, while there was an excess in this respect on her part, care ought to be taken to breed from a male, calculated by the comparative shortness of his legs, or the great depth of his chest and shoulders, either to correct the tendency or impart a body of proportional power.—Ed. Mag.

my mind is by far the strongest, is color; next, I would place smallness of the head and ears; in the horse, ox, and sheep, prominence of the eye; in all wideness of the chest, tendency to fatten, early maturity, tranquility, and love to man, or rather dependance on man.

Let us now proceed regularly, and commence with the horse, as the most noble as well as the most useful animal. The influence that the male has on this class of animals is the most striking. Every one must recollect how, in blood-horses, the color of the sire goes throughout the progeny, and, in a dealer's stable, every grey is a Delphini or a Sir Harry Dinsdale, every black a Sorcerer or a Thunderbolt, and so on. While you hear people constantly remark that such a horse can be nothing but a get of such a one—what is this but to say, the color and appearance of the male goes throughout the produce? In work-horses it is the same. A very strong instance of this was visible some years ago in the county of Kincardine. Here there was not, I suppose, one single mare to be found of a chesnut-color, when Mr. Barclay, of Ury, brought down a Suffolk punch, of a bright red chesnut-color, and in a few years plenty of chesnuts were to be found. A few years afterwards, a dun or slate-colored stallion gained the prize from the Kincardine Agricultural Association; when he came into the country, dun-horses were very rare, now they are to be found everywhere. In the county of Fife, some years ago, a horse called Sportsman, found his way from Yorkshire, and covered a vast number of mares, particularly those belonging to the farmers, which at that time were either black or grey. This horse was a rich dark brown, with a tanned muzzle, and he instantly made a very large proportion of horses of that favorite color; and what is still more remarkable, he was himself one of the best trotters ever seen, and his progeny were so also, so that the farmers talking of a good trotter, would say, "O yes, he is a Sportsman." Sir Robert Dick, a few years ago, purchased a work-mare, which I happened to know the breed of for several generations. She was black, very large, and coarse; eyes small, head and ears large, and very rough at the heels. This mare was put to Caleb Quotem, a beautiful bay horse, with much of what dealers call gaiety. I saw the produce; it was bright bay, with no hair at the heels, the eyes large, the head and ears small, and altogether the produce had put on the appearance of a blood-horse. Here the dam was of the cart breed. Let us look the other way: Mr. George Harley Drummond had two or three thorough-bred mares, which had thrown foals, small in size and deficient in bone to a blood-horse. He put them to a cart-horse, they instantly produced stout boned colts, with much hair at heel, and altogether like the sire. In the year 1821, I purchased a very neat small mare for a relation of mine, which had a foal at her foot by a cart-horse; this foal turned out to all intents a very good cart-horse. The mare was afterwards put for three seasons to Kutuzof, and the foals were in all appearance like blood-horses.

The late General Ayton, of Inchdairnie, a great many years ago, sent down a horse from England to his property in Fife, which covered the country mares in his vicinity [at that time, I am informed, very poor beasts,] and produced such wonderful effects on the breed in that neighborhood, as may be seen this very day; the horses in that quarter being the best in the country, and particularly remarkable for width of chest, docility in work, and altogether fine animals. Last year [1824] I chanced to see the tenantry of a gentleman, who has the district which lies along the banks of the river Avon, in Aberdeenshire, driving his winter store of coals. The horses struck me as being far above the common run of those in the Highland glens, and in fact first rate, compared with what ten years before I had seen in the carts of the self-same farmers. I was at first somewhat at a loss to find out how so great a change had taken place, as I knew that the land in that part of the county was all held by small farmers, who neither could nor would purchase large high priced mares to breed from, far less those horses then in my view. I soon found, on investigating the matter, that the whole change had been brought about by good stallions; and in this way: The different agricultural associations in the north have, for many years, been in the practice of offering large premiums for stallions, which brought troops of fine horses from the west of Scotland. After the best had been picked out for the prize, the rest were set adrift; and these horses, dispersed over the country, of late years, from the badness of the times and an overstock of them, covered at any price the farmer pleased to offer. Thus good horses wandered into their glen, to their very doors, and at such a price as these men could give; the result was what I have stated.

In the horse, then, it seems clear that it is to the *male* we must look for improvement. Not that I would be supposed to assert that the whole improvement can be brought about *at once* by the male; that, if a man were to put a Shetland pony to Eclipse—such a one, for example, as "The Great Unknown" has been pleased to mount Mr. Yellowlees on—were the little beast, from which the agriculturists' legs dangled, put, I say, to Eclipse, no one would hope to procure a racer; nor can we think that a Lincolnshire black, and a Highland garron, taken out of a peat cart, will produce an animal fit for a London dray; but by repetition the end will be produced. I once put the question of the Highland Society to a very able man who fills a chair in one of our universities, and who is an observer of nature of no ordinary cast, and who also, from his profession, (a medical man) may be supposed to be a good judge. His answer instantly was, "The male, without all doubt, but (added he,) you must have a female capable of developing the good properties of the male, otherwise a good male will be thrown away."

I would next look a little at the influence the male has on the *ox*. Here, although I still see the male have by far the greatest influence, I would say that there was a shade of difference, perhaps five per cent. less than in the horse. The cow appears to be an animal whose progeny is often much affected by her imagination during the time of conception, or rather during the period when she is in season. We have the most ancient, as well as the highest authority for this, in the peeled rods of Jacob; and from what my own experience, as well as the information of trustworthy men, has taught me, I am inclined to think that the calf very often takes after the beast that has been jump-

ing on the cow, (whether ox or cow,) previous to her being taken to the male. One of the most intelligent breeders I have ever met with in Scotland, Mr. Mustard,* an extensive farmer on Sir James Carnegie's estate in Angus, told me a singular fact in regard to what I have now stated. One of his cows chanced to come into season while pasturing on a field which was bounded by that of his neighbors; out of which field an ox jumped, and went with the cow until she was brought home to the bull. The ox was white with black spots, and horned. Mr. Mustard had not a horned beast in his possession, nor one with any white on it. Nevertheless, the produce of the following spring was a black and white calf with horns. I have twice had pure Ayrshire cows, which are uniformly what is called red and white, with horns. The first of those I put to a brown bull without horns; the produce was very dark red, without any white, and polled. The next cow was put to a jet black bull with horns. The first produce was dark red, without any white, and the next was jet black, and also without any white; and in both cases the make of the progeny took greatly after the sire. On settling in the north of Scotland as a farmer, I soon perceived that one of the greatest defects in the cattle was a tendency to be knock-kneed behind, and in my endeavors to get rid of this, I procured a bull from the south of Scotland, free from that defect, and with him crossed the best looking cows of the country. I instantly got rid of that narrowness behind observable in all cattle where no attention has been paid to the breed; and, in a few years, by drafting such queys as did not please me, and breeding only from good shaped ones, I made a breed for myself, which I had done before I knew it, for, having one season lost almost all my own calves, I was, in consequence of this misfortune, forced to buy in calves. These were treated in the same way as to food, &c., as my own, yet those from my own cows soon shot far a-head of them, both in size and condition; and on examination of the two sets of animals, an evident superiority of form existed in those of my own, especially in the smallness and beauty of the head, with a prominent eye; and, a fact not hitherto mentioned, that of the tail being one-half less as to thickness than in the unimproved breed, while a wide chest, (that unerring sign of a good and quick feeder,) was very conspicuous.† It would seem that horns had been given to the cow by nature, and that the polled breed have been procured by selection of some of those varieties we so often see, as I observe that it more frequently occurs, when a polled bull is put to a horned cow, that the produce resembles the mother in that particular, than when a horned bull is put to a polled cow, when horns are almost always the consequence.† A great many years ago, the present Sir Alexander Ramsay, of Fasque, brought a few of the Lancashire cattle to Scotland, a breed then much in fashion, and, as every one knows, remarkable for having uncommonly wide spreading horns, and all with some white, especially on the back. These cattle were intermixed with the cows of the country; and when Sir Alexander came to his estate, the cattle were all horned. About that time the polled or dodded cattle came greatly into vogue in Angus; and Sir Alexander purchased, from time to time, jet black polled bulls, so that in a short time all his cows were of this sort. Nevertheless, every year, even to this day, one or two of the calves "cry back" to the Lancashire, having white, and hornes; and, what is singular, it is almost invariably in the male that this takes place.

An instance of the influence of the male in the progeny of the cow is narrated by Bewick, the natural historian. He is treating of the original breed of wild cattle, which still exists in a few parks belonging to noblemen in the north of England, and in one or two places in Scotland. They are uniformly pure white, with black, or sometimes red ears and noses, and always extremely wild and fierce. At Chillingham castle, in Northumberland, says Bewick, cows used frequently to be turned into the park when in season, which were covered by the wild bull; and what is strange, the produce from all those cows were uniformly white, with red ears and noses, and greatly partook of the character and qualities of the wild bull. Here, then, is a very strong proof of the influence of the male parent, and others equally strong could be quoted, did I not think it better to pass on to another animal, the *sheep*.

Here the influence of the male parent is most striking. I have stated in a former part of this essay, that I have been in the habit of purchasing a couple of scores of highland ewes every year, to put to the Bakewell ram. Let us look a little at the characteristics of every breed in a wild, or at least nearly wild state. We find them muscular, active, restless in quest of food, ever in motion, and refusing to lay on fat.‡ Such I found the highland ewes; they were all small, with black legs and faces, and had horns. On being put to the Bakewell, they produce lambs of a totally different breed from themselves, all having the greatest tendency to get fat, the wild, wiry appearance of the Highlanders being entirely gone; and in its place we have a round fleshy animal, resting peaceably in the fields, the desire to break over fences, having likewise disappeared; and what is remarkable, not a single lamb is to be found with black legs, or a black face, and scarcely one with any sort of horn,§ while all are of a very large size. They thrive remarkably well, any that I have allowed to grow up as an experiment; and I have always found them much more free from disease than either the Bakewell or the black-faced sheep,

* This gentleman's stock are all jet black and polled, and so remarkably alike, that they show much care in attending to the breed.

† "An observation which Dr. Jenner made to me about ten years ago, (the truth of which has been since confirmed by my own experience,) that no animal whose chest was narrow could easily be made fat, applies particularly to the Merino sheep, which are in general contracted in that part, and is well worth the attention of those who wish to improve this breed."

Sir J. Sebright.

† An old French writer on agricultural subjects imagines that polled cattle are degenerated. He says, "Mene en Ecosse on trouve la race tres petite, et fort souvent sans cornes."

‡ Look at the hare and the goat, however well fed, they will refuse to lay on fat.

§ Some few have a sort of shrivelled horn, which drops off, or more commonly they rub them off in the autumn.

particularly the rot of the liver, which makes dreadful havoc amongst the Bakewell; nor does it spare the Highlander, especially when put on high keep. I cannot speak much of the appearance produced by a Highland ram with the Bakewell ewe. Being fully convinced of the power of the male on the offspring, I have always accounted it as loss to put a bad male to a high-bred female, and have never done so. I have, however, observed, where the country people have purchased high-bred sheep at any sale of mine, and bred from them with the ordinary rams, that the breed very quickly got bad, whereas, when a Bakewell ram had been purchased, I have seen a most remarkable change on the quality of the sheep; and in several instances where the ewes had been tolerable from which they had bred, the cross was so nearly resembling a new Leicester, as to deceive any one who was not a thorough judge. As I wish to confine myself to facts which have come under my own observation, I shall forbear to mention circumstances which tend to prove the great power in the male as to influence in the progeny of the ewe, as I have them from others; and shall conclude with the *sow*.

The influence of the male in this animal is as great as in the sheep. A few facts will show this. A friend of mine, soon after I commenced farming, [thinking, no doubt, to do me a great kindness,] made me a present of a sow of the wild species, in pig to a boar of the same sort. She was sent to me by sea, and during the voyage she broke out of the crib into which she had been put, and when the crew attempted to replace her, she attacked them with open mouth, and forced them to take shelter in the rigging. I put her into a high walled field, where she showed every mark of a wild animal, starting off at the least noise, and running very swiftly to some concealment. When the time of littering came near, she set to work, and carried in her mouth great quantities of withered grass and rushes, till she had a heap the size of on ordinary hay-cock. Here she had ten young ones, so concealed that no trace of them could be seen. When the heap was approached, she made a noise something like the bark of a dog, ran furiously to attack the person who had the temerity to invade her abode. In a short time the young ones made their apperance, they were all perfectly alike, being of a red or dark yellow color, with regular black stripes, like a tiger or zebra, down the sides. As they grew old they became darker, till they resembled the sow, which was of a port wine color. When it became necessary to take them, the mother was secured by a noose thrown over her, and the young ones were hunted down by a number of men. When escape was impossible, they gave battle, and offered to bite very furiously.

I now put the old one into confinement, where she had a second litter to one of the pigs, which were in all points like the first. I next put her to a boar of the Duke of Bedford's improved breed. At once the litter had a totally different appearance; the pigs were all different from each other, some had a slight kind of stripe, some none, some were light, some dark. Those which had stripes when littered lost them, and grew lighter in the color as they grew up. The leg had become shorter, as had the snout. They soon inclined to come out of the inside stye to the feeding trough, when the feeder put meat in it, and would feed while he stood by; and, lastly, they proved much better thrivers, getting very fat, which the old one and all the former pigs refused to do. I gave a neighbor a boar of the first litter which he put to several of the Duke of Bedford's sows, where the change was equally manifest; the zebra stripe, the long snout, and the length of the leg appearing in the whole of the young ones. I was now very sick of the sight of them, and sold them all off.

My stock now consisted of a cross between the Duke of Bedford's and Squire Western's improved Essex, and were as fine as any I ever saw, being as remarkable for tameness and good nature as the sort I have been speaking of were for the contrary. After breeding from these for some years, they at last got such a tendency to get fat that they were entirely lard, and almost useless from being too fat. Pork at this time had declined so much in the market, and the prices were so far from remunerating ones, that I parted with my whole stock but one sow at what they would fetch, thinking the first loss the best. From this sow I had too litters [previous to reducing my stock,] by the full bred boar. They were like herself, short in the snout, had very small ears, hardly any legs, and were so tame that they would eat a few oats out of the man's hand who fed them. Having now no boar of my own, I had to look out for one; and being informed that a gentleman and neighbor of mine had a pretty good one, I sent a man and a cart to beg the loan of him. I chanced to be in my yard when the man returned. My surprise was great when I found he had a beast muzzled and tied down with a quantity of ropes; and on his being turned into the sty, he proved to be a beast raving and foaming at the mouth, with long legs, a long snout, ears twice the size of the sow, and a long shaggy coat covering lank sides. In short, it looked as if my man had got a hyena out of Mr. Polito's caravan, rather than a boar from my neighbor's farm-yard; and, when put together, they by no means answered to the words of the old song:

"Oh sure a pair was never seen
So justly formed to meet by nature."

The offspring of this alliance was exactly what I expected; the cross had greatly increased the size, the pigs being longer than either of the parents, while much of the boar was to be discovered in them; the snout had considerably lengthened, as had the ears and legs. The whole of my breed were pure white, with hardly any hair on them. The pigs were some black, some spotted, and had a sufficient supply of bristles; and above all, they were lively, active, wild things, refusing to come near their food while any one stood by, and had lost much of the tendeney to get fat.

(To be continued.)

STRICTURE AND DEFENCE. HAS SILK-CULTURE BEEN STRONGLY AND UNEQUIVOCALLY RECOMMENDED BY THE FARMERS' REGISTER?

We have just been shown by a friend a passage of a private letter (dated Feb. 12th,) intended for reproof and correction of our editorial course, in the matter stated The lines are as follows:

"I do not think the Farmers' Register is taking the right attitude in this matter. Why does not the editor give his subscribers at least one essay from his own pen, of no *equivocal* character, in favor of going directly into silk-culture?—of our giving up at least a portion of the cultivation of tobacco, and substituting the growing of the *morus*, and the actual making of silk? I think that an article of this kind from his pen has been looked for by many, and would produce effect. But instead of this he seems inclined to accord in sentiment with that most excellent man ————, who, for some time past, has been making for himself a hobby, out of the exposure of the hobby-riding of others. Now, my opinion is this: If the mulberry speculation be a mania, every man ought to do his utmost in giving to that mania the happiest direction. Urge it—urge it *onward* to the making of silk."

The writer of this remonstrance is a gentleman for whose talents, virtues, and patriotism, we entertain great respect, and whose censure, therefore, we are very unwilling to bear. And as the opinions of one so intelligent may also be entertained (and indeed we have had sundry such intimations from other quarters,) by others of our readers, we shall beg leave to prove that they are mistaken, by quotations from the words, or reference to the substance of what we have said, and in language "of no *equivocal* character," to *urge* the adoption of silk-culture in Virginia; and that not only recently, since the mulberry speculation has given a very general direction of our countrymen's views to silk-culture, but for years before, when no one else in Virginia had raised a voice in favor of its adoption, and when for years thereafter, there was no echo, or favorable response to our own expressions, which probably then passed unheeded by our friendly censor, because he then felt no interest in the subject. We beg of him now, and our readers in general, to read again the passages quoted or referred to, which are hastily selected by glancing over the "editorial remarks" in the index of each volume. Every person who has the volumes in possession may resort to the same sources of information, and may read many *later* editorial opinions more fully stated, and more strong, than any we will here quote; and may also see whether we have omitted any thing of opposite tendency. But we readily admit this—that we *cautiously*, and but slowly at first, became convinced of the absolute and certain and remarkable fitness of Virginia, and a large portion of the United States for silk-culture—and we have not on this, or any other proposed improvement, expressed conviction, and certain assurance, before being truly and entirely convinced and assured of its value. If that degree of caution—which we deem due, both to truth and to the claims and interests of our readers—has subjected our words to the charge of being "equivocal," then we must be content to bear it, as unpalatable as that word may be. But except that we have not "run riot" in setting forth and exaggerating the benefits and supposed profits of silk-culture, and have not guarantied the truth of the very common estimates of enormous conjectural profits, (which course would perhaps have satisfied the most sanguine projectors—and would have displeased no one—) a fair review of all that we have said on this subject, will show, at first, a reasonable and sufficient support of the introduction of silk-culture, gradually increasing to the conviction and certain assurance of its very great value for Virginia. Readers are apt to notice very slightly, if at all, opinions on subjects in which they feel no interest; and also, opinions which are much more moderate than their own, on subjects in which they feel even great interest. We infer that to one of these two causes must be ascribed our friend's finding our praise of silk-culture either too faint or "equivocal." But if he were as warmly enlisted in feeling on the other side, and deemed the business altogether unsuitable to this country, we suspect that he would have seen, in sufficiently bold relief, and would have strongly condemned, our long continued, frequent, and *unequivocal* recommendations of a new culture, deemed by the censor as likely to injure, and in no way to benefit, the agricultural interests of this country.

The first volume of this journal (commenced in 1833,) contains no editorial writings in recommendation of this business; but sundry selected articles, either instructing as to the management, or showing the progress made in silk-culture in remote parts of the United States. In the second volume commenced sundry translations made for this journal, from recent French publications imported specially for the purpose, and which constituted the only, and yet a very valuable source of supply of such information on silk-culture to this country. In presenting these translations, we were *in advance* of the interest and demand of the public; and hence they were then but little noticed or prized. In the publication of our third volume, (at which time the subject was attracting more general attention in the northern states, though still almost none in Virginia,) and more and more since, our extracts and translations increased, with the supply of materials, and with the increase of interest evinced by the public; and latterly we have feared that we had urged the importance of the subject of silk-culture on our readers to the degree of satiety, if not of disgust, to those who are not as zealous and as sanguine on the subject as our friend is and as we claim to be. We proceed to present the extracts of editorial remarks.

In vol. iii, Farmers' Register, (1835) page 4[illegible]

occurs the earliest editorial article on this subject, It follows an account of the principal silk companies which had then been started. The only omitted portion merely presented some well-established and striking facts in evidence of the fitness of the native mulberry *(morus rubra)* for feeding silk-worms.

"The foregoing article shows at a glance that the people of New England are about to make silk-culture a large and important branch of their rural economy. It is there no new and untried speculation. The business has long been pursued in Connecticut, and with results so satisfactory as to induce these recent and far more expensive investments for the same object. If good profits can be there made, in the cold and unfriendly climate of New England, (where it is yet a problem to be solved whether the best species of mulberry can stand the winter's cold,) how much more profitable would the business be in Virginia, and the more southern states? Our *cheaper* slave-labor would also afford advantages; and many aged or infirm hands could be profitably employed in this business, who are now a useless expense to their owners. Much land that yields no net profit under usual crops, would serve well for mulberry trees.

"The opinion expressed above of the worthlessness of the native (black or red) mulberry tree, [*morus rubra*] for yielding silk, is as general as it is erroneous—and the error (though of use to nursery-men,) is very injurious to the community, in causing all efforts in silk-making to be postponed until mulberry trees can be reared. Now, though professing to know very little of silk-culture, we will venture to assert that those who can *succeed well*, by using leaves of the white mulberry, will not *fail*, nor do a much worse business, with the black. The black is doubtless somewhat inferior to the white mulberry, as this is to the Chinese: but the difference of products from either two, would not be so great as would be made by the difference of care and management of almost any two new silk-growers."

"But while we advise those who wish to rear silk-worms to use the native mulberry trees, if they are ready and convenient, we also recommend to them the immediate planting of a better kind, and especially of the new Chinese, (or morus multiculis,) for future use. If there is doubt whether this valuable tree will thrive farther north, there can be none here; and as it furnishes undoubtedly the most abundant and nutritious food, and as the silk business *must* extend rapidly, every acre of land now, or soon, planted with cuttings of this tree, will be almost sure to yield a highly profitable crop, either for sale or for use."

In the same volume, p. 674, the following remarks introduced a long and elaborate estimate from the Albany 'Silk-worm,' of the expenses and profits of commencing and carrying on mulberry and silk-culture.

"We are not competent to decide on the correctness of the following estimates, which however rest upon the respectable authority of the editor of the journal from which they are copied. But *this* we are prepared to maintain—that if such profits can be obtained near Albany, much greater would reward similar efforts in Virginia, on account of our greater cheapness of land, cheapness of the labor which young or infirm slaves, now an expense, might supply—and still more, on account of our longer summers and milder winters.

"Most of our readers possibly—and certainly most of the southern people who are not our readers—have no idea of the recent great and rapid extension of silk culture in the comparatively unfriendly northern states. Joint-stock companies have been formed in almost every northern state, and large capitals invested, to carry on the entire business, from raising the mulberry trees, to the manufacture of the products of the worms. Either these people are mad, or we in Virginia, (especially of the middle region,) are in this respect, more than usually blind to our own interest.

"Three new periodical journals are specially devoted to giving information on silk-culture—and three new treatises or manuals have been published, in addition to the several of somewhat older date. These facts, even more than the formation of joint-stock companies and the investment of large capitals, prove that the public mind and interest are awakened—that knowledge is every where sought—and that truth must speedily be found, and generally acted upon. Would that such a spirit of inquiry existed in Virginia, either as to silk culture, or any thing else in which our true interests are concerned!"

At page 731 of vol. iii, in some remarks in support of our previously expressed opinion that the seeds of the morus multicaulis would not produce the same kind, and in reply to Mr. Roberts, who maintained the contrary, occur the following passage, which, as well as many others previous and subsequent, exhibits proofs of early interest felt for the propagation of this valuable tree, and of *good service offered* to the public, in information in regard to its propagation, which, if heeded, would have prevented many impositions, losses, and disappointments, by purchasers relying on the seeds, or pretended seeds.

"We were the first to make known this European opinion, (in an article translated for the Farmers' Register;) and deeming it both true and important, we have frequently endeavored to impress on those who were about to raise mulberry nurseries, not to trust to the seed of the morus multicaulis. In this we certainly had no private interest to serve, either direct or indirect; to which influence Mr. Roberts attributes the objections of some persons to the use of the seed. We have presented before, and shall again, in the following piece, opposing views, as freely as our own; and we should be highly gratified if our brother editor and esteemed fellow-laborer in this cause, can maintain his position—which would be the means of introducing this valuable plant far more rapidly and widely, than merely by the use of cuttings."

The next editorial article (vol. iv, p. 126) will be copied entire. In explanation of the failure of the scheme there announced, and in regard to which we were then so sanguine, it is proper to state that the execution was not even commenced.

It had been started by a single individual, who was expected to undertake the entire management, and on whose zeal, care, and judgment, all the other subscribers of stock entirely relied, and were willing to venture their money, though without intending to give any of their own time or attention. A change of circumstances prevented the gentleman, on whom all operations depended, from undertaking the charge; and, therefore, no action was taken as to the scheme.

"A company has been very recently made up in this place to begin the business of mulberry and silk culture, as soon as the proper season arrives; and from our knowledge of the individuals who have commenced this exterprise, we can safely predict, that there will be nothing wanting to insure success, if zeal, energy, intelligence, and the investment of sufficient capital, can command it. We rejoice most heartily in this movement, and consider it as the germ of future results of incalculable value to this region. In all our many efforts, made through this publication, to urge the commencement and zealous prosecution of silk-culture in Virginia, we have not pretended to have any personal knowledge of the particulars of the business, or the grounds on which to estimate profits. But we have assumed this general position, which we think cannot be shaken—*that if silk-culture is profitable in New England*, (as it undoubtedly is,) *much more profitable must it be in lower and middle Virginia.* We have superior advantages, (for this purpose,) to our northern brethern, in our warmer climate and longer summers, the very low prices of lands, and also in a large amount of labor, altogether suitable, and which yields nothing for other purposes. Lands in the central region, exhausted and hilly, but well suited for the growth of the mulberry, may be now bought at $2 or $3 the acre. For land of much less value for silk-culture, the silk companies of the north seldom pay less than $100 the acre. So great is the difference in these respects, that we have long entertained the opinion, that by far the best course that a northern silk company could take, would be to establish its operations on a large scale on lands in Virginia.

"There is an establishment already existing in Petersburg, which is admirably suited to be devoted in part to raising silk. This is the Poor House farm. This establishment is unusually well regulated, and has already every thing necessary to carry on the silk business on a large scale, except the mulberry trees, and a cheap additional building for a cocoonery. There is enough and good land to plant—plenty of suitable labor, there being usually 30 or more young or infirm paupers, most of whom are fully competent to attend to this light work, and whom it is impossible now to employ, profitably, if at all; and moreover, there is already existing that constant and excellent supervision and strict attention, which are indespensable to the success of the silk business, and which it would be both costly and difficult to obtain for a new establishment. Nor would the adoption of this suggestion create a rival to the silk company just formed. On the contrary, every like experiment would serve to aid and increase the lights, and to lessen, by sharing the losses, caused by inexperience, of every other new establishment. There is no danger of overstocking the silk market, even if silk were cultivated on every farm in Virginia, between the falls of the rivers and the mountains.

"In all the northern states, individuals and societies are every where going into the silk-business. Many and large capitals are already invested—and every week there are annunciations of other new undertakings. No one there expresses even a doubt of the success and profit of the business: and it should be remembered that silk-culture has already been carried on profitably for more than half a century in Connecticut.

Wherever the white mulberry tree grows, (no matter of what color the fruit may be,) proprietors ought to save the seeds of the present crop, as largely as possible. There can be no crop planted that will yield more profit, for sale, than the young trees, unless it be of the still more valuable Chinese mulberry. The white mulberry grows abundantly along the shores and banks of James River, and probably on all our tide-waters."

In the same volume, p. 251, the following is the first part of an editorial article on "*Anticipated changes in the agriculture of the United States.*"

"Some considerable time has now passed since we yielded, slowly and with difficulty, to the belief, that the introduction of silk-culture in this country would be extended widely and profitably: and since adopting that opinion, we have made continually repeated efforts to impress on the people of Virginia, and the other southern states, the superiority of their facilities—in better climate, cheaper land, and the surplus and now expensive hands—for carrying on this new business, over those of our northern countrymen, who have already proved the advantages to be derived, and are investing large capitals in numerous adventures for this object. In New England, where most of these efforts are making, there is no superfluity of labor. Fortunately, every poor female, and all persons infirm from either tender or advanced age, may be, and usually are, employed profitably, according to their measure of bodily power. Yet still it is considered profitable to *divert* much of this labor to the silk-business: and that too, in a climate so rigorous that artificial heat must be used frequently in rearing the worms, and the best kinds of mulberries are often greatly injured, if not killed to the ground, by such severe winters as the last. In Virginia, there is no difficulty as to climate—thousands of now unemployed and expensive hands might be given to the work—and lands, now unprofitable or neglected, and at very low prices, would serve as well for planting, as those selling ten or twenty times as high in New England."

At page 335, vol. iv, after giving the resolutions of a public meeting in Loudoun, which recommended the introduction of silk-culture at the poor-house of that county, we added the following comment:

"We rejoice to see, in the above resolutions, a movement on the plan which we have before recommended, and still consider one of the safest grounds on which to commence silk-culture in Virginia. Each of our county and town poor-house establishments furnishes enough of land, labor, superintendence and capital, for this pur-

pose. Let this most suitable direction be given (and in proper manner,) to these now wasted means, and poor-houses might perhaps cease to be nuisances—expensive, not only of public money, but of the labor and morals of the most destitute class of society."

All these strong expressions *preceded* public opinion or feeling in Virginia, and therefore were neither profited by, nor perhaps scarcely noticed, by our readers. But they certainly will suffice to show that our recommendations of silk-culture were neither wanting nor "equivocal." Since the recent mulberry mania has been raging, and there has thence sprung up, (most fortunately, though by most illegitimate deduction,) a more general and a very strong disposition to enter upon silk-culture, our own previous favorable opinions have been more and more strengthened by the acquisition of new facts; and these opinions have been stated repeatedly, and at length, in sundry articles in the sixth volume, and in the preceding pages of the current volume. It is true that our zeal, and estimates of profits, are still much in the rear of the most sanguine—that we have insisted that the *dealing in mulberry plants is not silk-culture*—and that, unless turned to silk-culture, the mulberry speculation would be but a bubble, not only worthless, but injurious to the country. We have also presented, fairly, selected articles on both sides, as to the recent appreciation of the morus multicaulis; and moreover, we have been backward in expressing our own increasing estimation of the market value of these plants, (as founded on the manifest growing movements towards silk-culture,) because we were fearful of being subjected to a charge directly the reverse of that of our friend—that is of aiding to increase the excitement for buying mulberry plants, because our own private interest would have been greatly benefited by increased demand. We know that our friend has had no such private interest to increase his fervor, or to impose a restraint upon his words of advice to the public. If he had, we are sure that he would have felt the weight of such trammels.

But however restrained, we claim that our expressions in recommending silk-culture proper, have been numerous, strong, and any thing but "equivocal;" and we may claim as much in regard to the necessary branch and the foundation of silk-culture, the propagation of the morus multicaulis, the best mulberry tree for feeding. We shall not quote, but merely refer to, these numerous passages, which form no inconsiderable portion of the editorial articles of the last and current volumes.* And we are now enabled to add to the full exposition of views given at page 60 of this volume, that every day's information since that publication, has served to show that silk-culture proper is about to be commenced in very many parts of the country, and to such extent that we now have no doubt but that trials sufficiently numerous will be fairly made in this and in the other states, to establish the business, and to insure the increase of it to great extent by the next year. This is all that is wanting to establish also the certainty of the profits of rearing multicaulis plants this year. The recent granting of *very* liberal bounties by the legislature of Georgia, for all silk made in that state, for the next ten years, will greatly forward this end, even if no similar measure should be adopted in any of the other southern or slave-holding states. A similar law has just passed the lower house of the Ohio legislature. Seven other, at least, of the middle and northern states had offered bounties previously.

In making the foregoing quotations and references, in evidence of early and earnest support of the suitableness of silk-culture for Virginia, we have not gone beyond the pages of the Farmers' Register, because we have no right to suppose the opinions of its editor to be known elsewhere. But we will add here, that a much more full and elaborate argument, in support of this very object, has recently been addressed to this community from the same source, through a different form of publication. The material part of that argument will be presented in the next number of the Farmers' Register; and if it does not serve to convince the public of its soundness, it will, at least, leave no doubt of the earnestness of the writer in the maintenance of his proposition, that Virginia is not only well suited to profit by silk-culture, but better suited than any part of Europe.

From the Farmers' Cabinet.

FOOD FOR SHEEP. CAUTION.

Dear Sir,—I have sometimes observed potatoes recommended as food for sheep during winter. I have no doubt they are highly nutritious, but they should be used with caution, as I have found that they are injurious to ewes before they have dropped their lambs, as they cause such a flow of milk

*There are so many of such passages, and entire articles of great length, which have been published within a few months, that it would be superfluous to quote any. We may refer generally to all the Nos. issued since last July, and particularly to the following editorial articles: On Mr. Hicks' experiment, page 379; on the peculiar fitness of Virginia, for silk-culture, 391, and 464, 5, intrinsic value of the morus multicaulis, 391, 464, 467, 493, 497, 500, 504 of Vol. VI, and of Vol. VII, the full exposition of views presented at page 60; and several others in the previous pages of this number, which were printed before the message of reproof was received.

that the udder becomes so hard and the milk caked or thick, that the young lambs are unable to draw it out; and without the precaution of milking it out, the lambs must perish. After the lambs have come, potatoes may be fed to the ewes without danger, and will cause the lambs to grow rapidly. Turnips may be fed to sheep at any time without injury to the lambs. Yours, &c. S.

Chesterfield, N. J. Jan. 8th, 1839.

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

A regular business has been done in most articles during the month. Tobacco maintains the high prices quoted in our last—say $9 to 20. The quantity brought in for inspection has increased, but the quality does not improve much; the principal receipts consisting of green unmerchantable lugs and leaf, unfit for export. The export of the month is under 300 hhds—old.

Cotton has advanced, not in consequence of the improvement in foreign markets, but from the diminished supplies in our own; which strengthens the impression that the crop will prove considerably short of the last, and furnish a supply not fully adequate to the demand, on as extensive a scale of consumption as existed last year.

The receipts are, 730,000 against 910,000 bales, the exports about 300,000 against 550,000. Prices are nearly fifty per cent. higher than in February last, but manufactured articles have not advanced in proportion with the raw material.

The last accounts from England disappointed the expectations of holders of grain and flour. Prices had declined a little, but the averages (78 or 79 shillings per quarter) were considerably above the rate which admits these articles at the minimum rate of duty. Great exertions are making in England to abolish the corn laws, and there is considerable popular excitement there on other subjects. The exportation of grain from the Atlantic ports of France, and from Sicily, has been prohibited.

It is stated that on the 20th December, one hundred and twenty-four vessels were taking in cargoes of wheat and barley at Odessa, and so at all the other ports of the Black Sea. The Emperor of Russia had loaned three-fourths of the grain in the government reserves, to be divided among such merchants as had foreign orders; to be paid in six months without any interest.

The exportation of flour from this country to England has been checked by the recent advices, and the stocks in our markets will be greatly increased at the opening of spring.

The price of flour in our markets is $8 to 8¼ and of wheat 160 to 170 cents; corn 90 cents.

Bacon has declined to 10 to 11½ cents.

Exchange on England 9 per cent premium.

Feb. 25th. X.

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ERRATUM.—In editorial introduction on page 112, for "1833," read "1834."